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Purchase of Cars and Locomotives

The market conditions were never so good in years as they are now for the purchase of cars and locomotives. With the general depression in business all over the country the railways have found it necessary to store a large number of engines, and there is an unusually large car surplus. These things, of course, decrease the demand for new equipment and the builders of cars and locomotives are greatly affected by this condition of affairs. They have made savings by partially or wholly closing their shops, but this only reduces their loss, as a large part of the overhead expense must continue. In order to reduce their loss several companies have offered very favorable prices in the hope that the railroads can thereby be induced to buy. At these prices the equipment would be built at a net loss, but it would not be as great as if the equipment were not built at all. If roads that are able to obtain the necessary capital purchase equipment now they will make profitable investments, even though it be necessary to store the new equipment for a while. They will, besides, help the builders and also give employment to a large number of men now unemployed. When business again returns to its normal condition it is probable that the demand for equipment will be so great that it will be impossible to obtain prompt delivery and that prices will be higher than they have been for several years past.

An Illuminating Study of Demurrage

The United States Department of Agriculture has issued, for the benefit of the farmers of the country, a brochure on freight-car demurrage, in which farmers who ship products by rail are advised not to accept special concessions from the railways in the use of cars. Such privileges, says the bulletin, are far from being a real advantage. "The man who is backward in loading a car is contributing to the car shortage throughout the country, and from a general car shortage farmers are likely to suffer more than any other business men." Our paternalistic government meddles with a good many things with which it has no business; and at first sight a pamphlet on a transportation subject from the Agricultural Department looks like an example of the wrong use of public money; but the author, G. C. White, has in this case done his work so well as to merit warm praise. As he says, "the bulletin should be of interest to shippers of all commodities and to transportation men." Perhaps that department of the federal government which deals exclusively with transportation ought to have done this job, though it could hardly have been expected to do it in the trenchant style in which it is here done, by a single individual, studying the subject without responsibility, and having a free hand. At any rate, Mr. White has put into vigorous language some salutary truths which need to be recognized everywhere. Extracts from the pamphlet will be found in another column.

The Rock Island Situation

A brief description of the Chicago, Rock Island & Pacific stockholders' meeting in Chicago on April 12 is given elsewhere in this issue. The situation is complicated and interesting. There is a complaint before the courts which denies the right of the representatives of the majority of the stock to vote the proxies which they held at the meeting. One of the four directors elected at this meeting was N. L. Amster, who represents the minority interests. It is, of course, counsel for the minority interests who are pressing the complaint, which if it were upheld by the courts would make the election of all four of the directors, including Mr. Amster, at the April 12 meeting illegal, presumably. Mr. Amster, therefore, is placed in the position of accepting his election to the board as bona fide, in which case the complaint would have to be dropped, or else of refusing to recognize his

election as a director as legal, remaining on the outside and pressing the complaint. It might be pointed out that the majority interests are homogeneous, in that they are working for some constructive plan of reorganizing the company. They represent, however, very many different viewpoints and, probably in many cases, quite sharply opposed interests. The various classes of security holders other than the stockholders have interests in the future of the property, which in some cases are by no means identical, nor are they necessarily identical with the point of view of the majority stockholders. The bankers representing these various interests have, it is understood, generally supported the majority stockholders' position as represented by the Sheldon committee.

WANTED—DIRECTORS WHO WILL DIRECT

THE struggle over the Rock Island appears to have resulted in the control of the property being left in practically the same hands as before. But it has not been without important results. The minority stockholders won representation on the board. This is as it should be, for every element having a substantial interest in a property should have representation. But in the opinion of the *Railway Age Gazette* the changes made in the directorate were not the most important feature of the meeting at Chicago on Monday. In our opinion the most important feature was the remarks made and the resolutions offered by A. F. Van Hall, chairman of the Dutch Protective Committee of Stockholders. There were more sound principles and sound sense regarding the way a railway board should be constituted, and concerning the duties of directors, concentrated in Mr. Van Hall's brief remarks than we have seen put into an equal number of words in years. If Mr. Van Hall's remarks bear their appropriate fruit the Rock Island in a few years will occupy a different place in the esteem of the public, if not also in the field of transportation, from that which it has occupied for some years.

Mr. Van Hall acted with the committee representing the majority stockholders, but he refused to be blinded to the main cause of the troubles the Rock Island has been having. The main cause has been, as Mr. Van Hall said, that the board of directors has played a negligible part in the road's organization. Nominally the courts of last resort in the organizations of our railways, the boards of directors of many of them, are nothing but rubber stamps to register the wishes and ambitions of a few men who usually own but a small part of the outstanding securities. Commenting on the results of this condition in the Rock Island, Mr. Van Hall made the following statements, which deserve to be read and pondered by every man who desires the welfare of the railways of the United States:

> I am convinced that a great many things which have happened would not have happened if all the directors of the company had always been keenly aware of the trust which they have accepted, and of the responsibility which rested upon them for the proper execution of that trust. I firmly believe that they were not aware of it because they did not feel that they had been elected for such a purpose. Many members of this board, as of many other boards, have accumulated upon themselves so many directorates, have upon their hands the management of so many important affairs, that they cannot have started as directors in this company with the intention of looking after the business of this company as business men should. And this is the strangeness of the thing—every one will agree with me that a grocer who is not attending to his business will certainly see his business go to pieces, and so will a coal merchant or a hotel owner, or a banker. But with a railroad it seems to be otherwise. The boards of directors of this kind of business often seem to think that it is not necessary to attend to the business, and that things will look after themselves. That is all very well when there is a Harriman available to take the load upon his shoulders, but if there is not, things are bound to go wrong. It is true, there are difficulties in the way. Boards of directors are often very numerous and consist of men living widely apart from each other. How can you expect such a board to meet frequently and to handle situations carefully and promptly?

The statements we have quoted apply with as much force to the directorates of many other railway companies as to that of the Rock Island. The board of directors of many of our railway companies are composed of so many men that very few of them feel any special responsibility for the trusteeship they have voluntarily assumed or really exert themselves to perform the duties which they have solemnly undertaken to perform. A small part of the time of a really able man is worth a great deal more than a great deal of the time of a mediocre man; but, unfortunately, many of the able men who have accepted memberships on numerous boards have given almost no time whatever to the duties they have assumed on a large part of these boards. The consequence is that often they do not take an active part in the management of the companies, and that often when they do take an active part their ignorance of the conditions and needs of the concerns is so great that their activity does more harm than good

The remedy for this condition of affairs was pointed out by Mr. Van Hall.

> What we therefore need in a big corporation such as the Rock Island is a small board of good experienced business men, living not too widely apart from each other, who have got the time and are willing to devote it to the promotion of the business of the company. If there is a Harriman among them, so much the better; he will certainly not fail to assert himself. But even such a man will need the co-operation of other good men. If I remember well, it was the late J. P. Morgan who said that it was his experience that even the best and biggest technical men always needed sound financial advice.

Mr. Van Hall also advocated the payment of a substantial compensation to the directors.

To those familiar with the large directorates of most American railways the suggestion that a board should contain only seven members will seem radical, but a small board composed chiefly of men who live along the property, and who consider it a part of their business to thoroughly acquaint themselves with the public opinion and commercial and industrial conditions in the territory, and the needs of the property, will usually be far superior to the typical board composed of from fifteen to two dozen men who do not live on the property and who know almost nothing about it except what is disclosed in statistical reports concerning it. Of course, the kind of directors that we now have usually think that they are pre-eminently fitted for their duties. Th great trouble with them is that they have too much egotism and wealth, and too little knowledge and sense of duty and responsibility. A board of directors should be a working committee and not a list of ornamental and highly useless names, as so many are now.

On Mr. Van Hall's motion the stockholders of the Rock Island adopted resolutions instructing its board of directors to consider the desirability of adopting his suggestions and report thereon at the next annual meeting. It is understood that the management of the road is in sympathy with Mr. Van Hall's views. The results of the board's deliberations on the subject will be awaited with much interest.

LONG ISLAND RAILROAD

IF there is one point more than another on which the majority of railroad operating officers differ radically from the majority of patrons of railroads it is as to the relative importance and profitableness of passenger business as compared with freight business. To the majority of railroad operating officers the economical handling of freight is of much more importance than the development of passenger business. To the great majority of patrons of railways the passenger service which a railroad renders is the measure of the railroad's usefulness. Of course, both of these views have elements of truth in them and each is an exaggeration. Passenger business under the present rates in the United States is nowhere as profitable per train mile as freight business.* On the other hand, the very fact that the quality of the passenger service is so large a factor in the esteem or disesteem with which the public holds a road gives it an importance disproportionate to its net revenue as compared with the net revenue from freight.

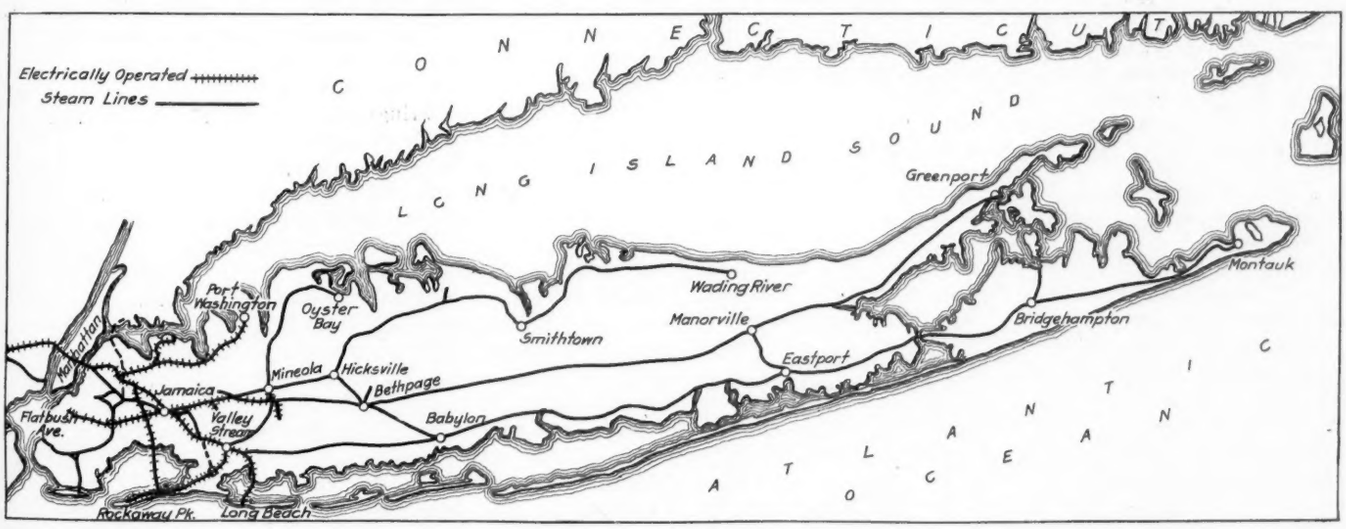
Mr. Brandeis pointed out in the 1914 eastern rate advance case that no one of the roads which had shown marked prosperity in the last few years had a very large proportion of passenger business. Nevertheless this question of passenger busi-

*Of course, there may be individual passenger trains which would show a larger net profit than individual freight trains, but the statement here made is intended to apply to averages rather than individual cases.

ness is one which is now being faced squarely and without prejudice by many of the railroad executives who are devoting a part of their time to a study of the broader questions of railroad economics and the relations of the railroads to the public. In this connection the Long Island Railroad Company's annual report for the calendar year ended December 31, 1914, is of particular interest. In 1914—the third-third year of its operation—despite the business depression, the Long Island showed the largest net revenue in its history, and a deficit, after paying fixed charges, half as great as the deficit for 1913. The fact that there was a deficit at all was probably due to business depression, and there are many indications in the annual report that the Long Island, after all the years that the Pennsylvania has put money into it, has at last turned its corner and is in a fair way to become a self-supporting railroad property.

The Long Island's conditions are unique. It operates 398 miles of road, of which four miles are trackage rights through the Pennsylvania Railroad tunnels from Long Island City to the Pennsylvania station in New York. It has practically no through freight or passenger business, the average length of haul of freight being 23 miles and the average passenger journey 14.5 miles. Of the total $13,220,000 operating revenue in 1914, $3,684,000 was from freight and $7,900,000 from passengers. The density of freight (ton-miles per mile of road) was 257,771 in 1914, while the passenger density (passenger-miles per mile of road) was 1,520,000.

The management of the Long Island, as will be seen, had



The Long Island Railroad

conditions to face which are peculiarly difficult. Like other American railroads, it has had to meet demands for continually increasing standards of passenger service. While, of course, it has no heavy fast long-distance trains, with comparatively few passengers per train-mile, which is characteristic of long through runs of trains composed entirely, or nearly entirely, of Pullman cars, it has a very large commutation business, and it has to meet demands for frequency of service which are unusually exacting.

On most roads that have made large gains in operating economies much of the saving has been made through a decrease in the number of trains necessary to handle the same volume of freight traffic. Most roads have shown an increase in the costs of operating each train-mile in both freight and passenger service. The small proportion of freight business on the Long Island leaves it but a small margin for possible gains in economy in this branch of the service and an analogous economy in passenger service; that is, fewer trains to handle the same amount of business is not feasible because of the public demands for frequency of service.

Shortly after the Pennsylvania acquired control of the Long Island in 1900 it was apparent that even with a large growth in business the Long Island would show larger and larger deficits. To offset this some means had to be devised for holding down operating expenses other than a rigid restriction of passenger-train mileage.

In part to facilitate more economical operation, in part to meet the demands of the public for a cleaner and more comfortable service, electrification of the western lines of the system for passenger service was undertaken. The accompanying map shows the lines now operated for passenger service by electricity. A similar policy was adopted toward grade elimination and the construction of permanent passenger stations and over and under grade crossings. Both of these improvements necessitated very large expenditures of new capital, and during the time the work was being done increased instead of decreased the operating expenses of the company. Such a program of investment for the quite distant future and to meet the demands of the public service could only have been made by a rich railroad, willing and able to wait for years for a return on its additional investment.

The result has been that since 1900 more than $50,000,000 of new money has been invested in the road and a debit balance to profit and loss had slowly been increasing, until at the end of 1914 it totaled $6,125,000.

In 1914, however, the results of operation were very encouraging. Total operating revenue amounted to $13,220,000. This is an increase over 1913 of $136,000, despite a loss of $329,000 in revenue from express, and despite the depressed business conditions which affected passenger travel on the Long Island to a marked extent. Operating expenses amounted to $9,116,000, a decrease of $453,000; but of this decrease $352,000 was accounted for by the lower cost of handling express business.* Railway operating income in 1914 amounted to $3,318,000, an increase of $566,000 over the previous year. After the payment of rentals and fixed charges there was a deficit of $494,000, a decrease in deficit as compared with the previous year of $484,000.

The total passenger mileage handled amounted to 605,528,000 in 1914, an increase of 11,928,000, or 2 per cent, over the previous year. This increase of 2 per cent in passenger mileage was handled with an increase of less than half of 1 per cent in passenger-train mileage, the total passenger-train mileage in 1914 being 5,449,000. Moreover, whereas passenger-train mileage showed a slight increase, the expenses for passenger enginemen amounted to $180,000, a decrease of $22,000 from the previous year, and the cost of fuel for passenger locomotives was $331,000, a decrease of $53,000 from the previous year. On the other hand, the wages of motormen amounted to $155,000, an increase

*In 1913 the Long Island entered into a contract with the Adams Express Company to take over its express business; and whereas, therefore, the revenue from express shown in 1914 is the net received from the express company, the revenue in 1913 was for five months the gross, and the cost of handling the business during those five months was a charge to expenses.

of $21,000 over the previous year, and the cost of "purchased power" amounted to $102,000.

A detailed study of both transportation and maintenance costs would show a reduction in a number of items, each of which is small, but the aggregate of which is considerable, due to electrical operation of all passenger trains on the lines shown crosshatched on the map.

The following table shows principal figures in 1914 and 1913:

	1914.	1913.
Average mileage operated	395	395
Freight revenue	$3,684,335	$3,508,173
Passenger revenue	7,899,972	7,814,299
Total operating revenue	13,220,334	13,083,925
Maint. of way and structures	1,457,510	1,611,313
Maint. of equipment	1,440,907	1,547,489
Traffic expenses	141,851	181,072
Transportation expenses	5,687,110	5,882,050
General expenses	345,088	347,169
Total operating expenses	9,115,779	9,569,093
Taxes	784,051	762,864
Operating income	3,318,434	2,751,969
Gross income	3,981,938	3,422,537
Net deficit	494,131	977,985

NEW BOOKS

Department Reports of the State of Ohio. Weekly; published by Nemar Publishing Company, 49 North High street, Columbus, Ohio. Price $10 a year; single copies 25 cents.

This is a new periodical, issued every Thursday, started for the purpose of giving to the public the reports and decisions of the Public Utilities Commission, all of the other commissions, the secretary of state, the attorney general and the supreme court, of the state of Ohio; and with news also of subjects of legislation, when the general assembly is in session. No. 24, dated April 1, contains about 40 pages, and includes decisions by the industrial commission, by the attorney general and by the supreme court of the state. A circular issued by the publishers contains commendatory letters from the Public Utilities Commission and from the attorney general of the state.

Graphic Methods for Presenting Facts. By Willard C. Brinton. Published by the Engineering Magazine Company, New York. 372 pages. Price $4.

In the preface to his book Mr. Brinton says that "the reader who examines only the illustrations and the titles without any reference to the text will undoubtedly get a major portion of vital material in the book. It is believed that an average reader may go through the illustrations and the titles in about one hour." With the first of Mr. Brinton's observations it is impossible to disagree. The book has a wealth of illustrations, which, if carefully studied, will give the student a quite comprehensive, although, of course, necessarily a superficial, knowledge of the principal methods of graphical presentation of facts. Although the sub-titles contain criticisms of the methods used in the illustrations, the text adds a great deal to the value of the work and is very readable. The fact that Mr. Brinton should attempt to expound a language by the use of that language itself is interesting and logical, but to the majority of lay readers of Mr. Brinton's book the English language of the text will form in all cases a source of additional information and in many cases a source of necessary information to make the diagrams and charts comprehensible.

The statement that the average reader can go through the illustrations and titles in about an hour illustrates one of the weak points in the theory of graphic presentation of facts. Not only would it be impossible for the average reader to go through all of the illustrations and titles and understand them in an hour, but it would be quite safe to say that a reader very much above the average who had not had long practice in reading diagrams and charts could not go through even a majority of the charts and diagrams in an hour and understand them.

In the attempt to make a chart or diagram an easy method of conveying facts or figures it is sometimes assumed that there is a mechanical substitute for comprehension. It is quite possible for any one to take one of the numerous charts which Mr. Brinton's book contains and almost at a glance get a certain kind of information conveyed to his understanding; but to assume that this is a substitute for an analysis of the facts is a fallacy into which it is quite evident from Mr. Brinton's text that he does not fall.

Apparently the fundamental theory on which graphic methods of presenting facts is recommended is that the eye can convey to the brain an understanding of relative sizes more accurately and more quickly through a comparison of lengths of line or area of surface than by the shape of a figure. Thus, if the eye sees the Arabic numeral 3 in conjunction with the word tons, and the Arabic numeral 9 in conjunction with the word tons, it does not convey to the brain as quickly or as accurately the relative quantitative importance of the two groups as it would if a line three units long were shown next to a line nine units long. In simpler quantitative measures this is not true. To the average man the fact that a ten dollar bill is no larger in size than a one dollar bill does not obscure the relative buying power of the two pieces of paper. When, however, we come to a complex series of facts, if the eye is to convey the knowledge of the relative quantitative values of these facts to the brain it must either take in all the facts at once or convey each fact separately to the brain to be there set aside and remembered, while the eye brings other facts to place alongside of it, so that all the facts will be held retained at the same time. By presenting a group of facts graphically they can be taken in by the eye as a whole, whereas if they were presented in a column of figures each fact would have to be conveyed separately to the brain and there retained while the other facts were being picked up one by one by the eye. This is what is meant very often when it is said that the *trend* of earnings, expenses, population or any other units can be shown better by a chart than by figures. All this Mr. Brinton brings out very clearly in his comprehensive work on Graphic Methods for Presenting Facts.

What has often been said of the ease with which figures can be made to lie is equally true of charts. Mr. Brinton's book gives numerous examples of misleading charts. These are criticized freely and in a very helpful way. On the other hand, Mr. Brinton at times assigns a function to a chart which the chart is incapable of performing. Thus he shows a chart on which the marks received by English school girls in arithmetic and in English respectively have been plotted, and in commenting on the line which is obtained says that its position proves that girls have much more ability in English than in arithmetic. The marks received by the girls are the proof of their ability and the chart plotting these marks is a graphic presentation of it, nothing more; it is not itself proof.

There are two functions which graphic presentation of facts may perform to better advantage than could either the English language or tabulations of figures. Attention may be drawn more easily and quickly to facts which need analysis, and facts may be conveyed to another person who would not give the time or the attention necessary to comprehend these facts if they had to be presented either in written language or in figures. It is of the utmost importance that the medium which is used to call attention to facts needing analysis shall be so scientifically adapted to its purpose that it will neither draw attention to unessential comparisons or permit comparisons to which attention should be drawn to escape notice. It is also of the utmost importance that if graphic charts are to be used to instruct the public or to help the operating or technical man to lay before his president or his board of directors facts in a form easy of their comprehension, the foundation for the science of chart making must be based on logical and scientific principles. It is the exposition in a comprehensive way of the mediums adapted to various kinds of facts, and the science and logic of the fundamental principles on which the very great value of Mr. Brinton's work rests. In addition to discussing, analyzing and illustrating these fundamental principles, Mr. Brinton's book also describes in detail the mechanical devices used in the graphic presentation of facts, such as map presentations, pins and beads, card records, etc.

An Effective Freight Claim Preventive Crusade

Part II—One Hundred Thousand Dollars Saved During First Six Months of Campaign, Ending December 31

In the first article of this series, which was published in last week's issue, we covered the preliminary steps which were taken in the educational campaign to reduce loss and damage to freight on the St. Louis & San Francisco. The efficiency associations which were formed at several of the larger stations, however, had this as only one of their objects. To supplement their efforts and wage a more direct and aggressive campaign, it was decided to organize freight claim preventive committees along almost exactly the same lines as the safety first movement had been developed. Each division and terminal* has a freight claim preventive committee, of which the superintendent is chairman. These committees are not divided up into sub-committees and supervised by the chairman, but act as one committee. The division and terminal committees are under the general direction of the Central Claim Preventive Committee, which is composed of the general officers of the road.

FREIGHT CLAIM PREVENTIVE COMMITTEES

The scheme was first tried out in June, 1914, on the Northern division. Four meetings were held under the direction of a division freight claim preventive committee—one at Ft. Scott on the ninth, one at Kansas City on the tenth, one at Pittsburgh on the eleventh, and one at Springfield on the twelfth. These meetings were all held in the evening, and over 300 persons attended the four meetings. Those men on the committee who were not on a monthly salary basis were compensated for loss of time from their regular duties and the company paid all traveling expenses. The purpose of the movement was purely educational and committeemen were selected because of their influence with their fellows, the idea being to secure the co-operation of every man who had to do with the handling of freight.

The movement on the Northern division proved so successful that it was decided to extend it to other points on the system as rapidly as possible. On July 7 authority was issued to organize committees at the Kansas City terminal, St. Louis terminal, Memphis terminal, Springfield terminal, and on the Eastern and Ozark divisions. A division freight claim committee is made up about as follows: Superintendent (chairman), assistant superintendents, yardmaster, agent, platform foreman, local engineer, local conductor, local brakeman, car inspector, car foreman, switch engineer, engine foreman, special agent and master mechanic.

The freight claim preventive committee at Memphis is a typical terminal committee and in its membership includes the following: Superintendent of terminal, agent, general foreman motive power department, general foreman car department, platform clerk, receiving clerk, yardmaster, day switchman, night switchman, day engine foreman, car inspector and yard engineer.

WHAT IS DONE AT THE MEETINGS

At the first meeting which a freight claim preventive committee holds at a terminal, it is the practice to place before the employees, in a clear and forceful way, the actual facts concerning the amount of money wasted in paying for loss and damage, and the possibilities which will result from co-operation on the part of each one of the employees in helping to reduce this waste. As far as possible the superintendent of freight loss and damage claims has attended all of these initial meetings and has outlined the situation clearly and thoroughly. In fact he has spent the greater part of his time for several months in traveling over the road, and keeping in close personal contact with all of the freight claim preventive committees. Possibly this intimate personal supervision is the greatest single factor responsible for the remarkable success which has accompanied the work of the committees. In addition to this, Mr. Whitelam has kept a steady stream of pertinent bulletins, statistical data, diagrams, reminders, and other material flowing from his headquarters to all parts of the system.

In the preliminary talk, for instance, attention should be drawn to the large amount of money expended for the payment of loss and damage per thousand dollars of gross freight revenue, and the possibilities of decreasing this amount by eliminating or cutting down certain classes of claims which are due almost entirely to carelessness or thoughtlessness on the part of those engaged in handling freight, thus not only saving money for the road, but making better satisfied patrons. A statement, such as the one following, showing the relation of loss and damage to freight to certain of the more important transportation department expenses, can be quoted from to good advantage. These figures are for the year ending June 30, 1914.

Passenger employees—station service	$324,089.32 or 2.05 per cent
Telegraph and telephone operators	395,082.50 or 2.50 per cent
Yardmasters and clerks	304,562.97 or 1.93 per cent
Yard enginemen	465,659.82 or 2.32 per cent
Fuel, water and supplies	481,569.26 or 3.05 per cent
Enginehouse expense, yard and road	578,269.43 or 3.67 per cent
Water for road engines	212,160.28 or 1.34 per cent
Care of passenger cars	269,341.31 or 1.71 per cent
Passenger supplies and expense	171,934.94 or 1.09 per cent
Care of freight cars	68,506.48 or 0.43 per cent
Freight supplies and expenses	170,575.78 or 1.08 per cent
Loss and damage—freight	513,954.90 or 3.29 per cent

Or possibly extracts may be used to advantage from the following table, showing claim payments made during the previous year for certain classes of freight due to errors of employees, improper refrigeration and ventilation, and improper loading and stowing, these particular items being the largest and most susceptible of reduction with the proper care on the part of the employees.

	Errors of employees	Improper refrigeration and ventilation	Improper loading and stowing
Boots and shoes	$ 264.60	.....	$ 109.48
Clothing, dry goods and notions	1,332.19	.....	951.43
Live stock	2,365.02	.....	140.20
Meat and packing house products	1,014.48	$2,732.65	169.05
Flour and other mill products	472.19	.....	134.54
Sugar	19.50	.....	85.04
Groceries	169.13	9.64	868.99
Wines, liquors and beers	63.22	232.01	157.77
Furniture (new)	5.94	.....	1,540.37
Household goods	107.16	.....	963.45
Glass and glassware	56.95	.....	1,339.77
Products of cement, clay and stone	105.00	.....	788.37
Stoves	33.70	.....	722.36
Iron and steel castings and bars	74.45	.....	194.00
Vehicles	9.79	.....	105.48
Agricultural implements	9.02	.....	186.96
Products of mines	423.57	.....	149.51
Coffee	20.84	.....	209.77

Then again statements showing the amount paid out in claims for various commodities and just what could be bought with this money, as indicated by the following items which are taken from an extensive list, may also drive home the importance of using greater efforts to prevent loss and damage.

A Few Things the Frisco Bought and Paid For, and Did Not Receive During the Fiscal Year Ending June 30, 1914.

Amount	*Commodity*	*Would buy*
$11,976.35	Boots and shoes	3,422 pr. shoes at $3.50.
31,671.69	Clothing, dry goods and notions	31,672 yd. silk at $1, or 452,453 yd. calico at 7c.
46,838.75	Fruit and vegetables	20,817 bu. peaches at $2.25, or 59 cars of 350 bu. per car.
41,415.51	Live stock	207 mules at $200, or 10 cars of 20 mules each.
28,478.62	Meat and packing house products	113,914 lb. breakfast bacon at 25c. per lb.
31,001.93	Grain	44,288 bu. wheat at 70c. per bu., or 44 cars of 1,000 bu. per car.

*The terminals at St. Louis, Kansas City, Memphis and Springfield are under the jurisdiction of terminal superintendents who report to the general superintendents.

Amount.	*Commodity.*	*Would buy.*
22,311.93	Flour and other mill products	9,700 98-lb. sacks flour at $2.30.
16,310.79	Groceries	Supply 652 families of 3 persons 1 month at $25 per family.
9,577.71	Tobacco	95,777 10c. cigars.
16,777.11	Furniture	Furnish 33 homes of 4 rooms at $500 each.
11,207.97	Household goods	Furnish second-hand furniture for 111 families at $100 each.
6,967.77	Vehicles	14 Fords at $500 each.

Another statement from which items may be quoted with good results is reproduced in part below:

$482,039.29 paid in claims for loss and damage to freight, fiscal year 1913-14, would have bought any one of the following items:

21	1040 class locomotives.
412	cabooses.
567	36-ft. box cars.
43,035	freight car axles.
53,616	freight car couplers.
302,395	air hose.
362,875	cast iron brake shoes, engine.
1,163,061	locomotive scoop shovels.
1,198,931	steam gage lamps.
1,463,206	cast iron brake shoes, freight car.
2,387,326	1 gallon oil cans.
3,239,950	½-gallon oil cans.
3,779,949	white lantern globes.
4,123,581	engine torches.
9,071,880	lb. cotton waste.
15,119,797	machine bolts, average size.
22,679,695	lb. 8 penny nails.

A motive power department employee will stop and think when he realizes that the amount paid out in claims for the fiscal year 1913 would buy 21 large freight locomotives. The conductor or brakeman cannot but be surprised when he learns that this money would buy 412 cabooses or 567 36-ft. box cars.

The importance of prompt reply to correspondence is also emphasized in order that the handling of claims may be facilitated. At present 56 per cent of all the claims are settled within a period of 15 days, and 68 per cent within a period of 30 days. The desire is to improve this record in order to secure the good will and the interest of the patrons.

There are 15,000 employees on the Frisco, each of whom has something to do with the handling of freight in some capacity. If each one of these 15,000 employees could save five dollars it would make seventy-five thousand dollars, or three-quarters of the amount which it was aimed to save in the first year. Statements can then be made giving specific instances covering a wide range of activities and showing how by a little care and thought abuses have been removed and losses stopped.

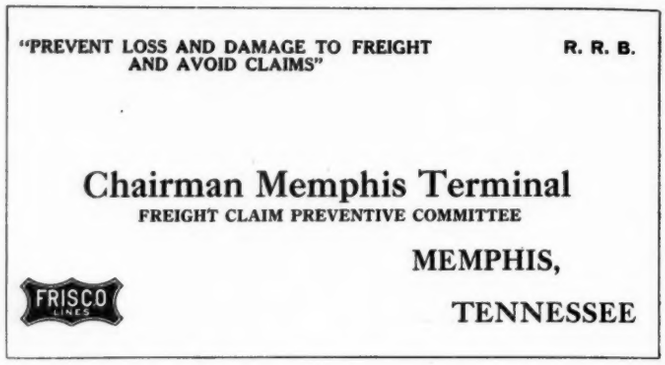
Usually after a brief address of this sort different members of the freight claim preventive committee discuss various phases of the question in which they are especially interested. The meeting is then thrown open and all present are urged to ask questions or make suggestions. This roughly covers the method of procedure at one of the initial meetings.

The succeeding meetings at each point are under the direction of the division freight claim preventive committee and are usually devoted to an analysis of the latest statistics available, the study of any bulletins which may have been received from the office of the superintendent of freight loss and damage claims, and a discussion of abuses which have been discovered at the local points and how they may be overcome.

FREIGHT CLAIM PREVENTIVE POSTAL

One of the more important details and one which has developed the greatest amount of material for discussion at the local meetings is a postal card, both sides of which are shown in the illustrations. The address of the chairman of the local committee is printed on one side. On the other side any employee may, and in fact is urged to, call attention to anything which comes under his notice, the remedying or bettering of which will, in his opinion, prevent loss and damage to freight. It is thoroughly understood that no discipline will be assessed for any mistakes or abuses that are called attention to in this way and that the information will be used for educational purposes only. The wide range of mistakes and abuses which have been located by these cards and the progress which it has been possible to make by their aid is remarkable. The abuses noted are immediately investigated by the superintendent upon receipt of the cards, and the investigations are discussed at the business sessions of the freight claim preventive committee. When the committees ride local freight trains the business session is held between stations. It generally takes a day and a half to go over and discuss the investigation.

Some idea of the extent to which these cards have been used


"PREVENT LOSS AND DAMAGE TO FREIGHT AND AVOID CLAIMS"

R. R. B.

Chairman Memphis Terminal

FREIGHT CLAIM PREVENTIVE COMMITTEE

MEMPHIS,

TENNESSEE

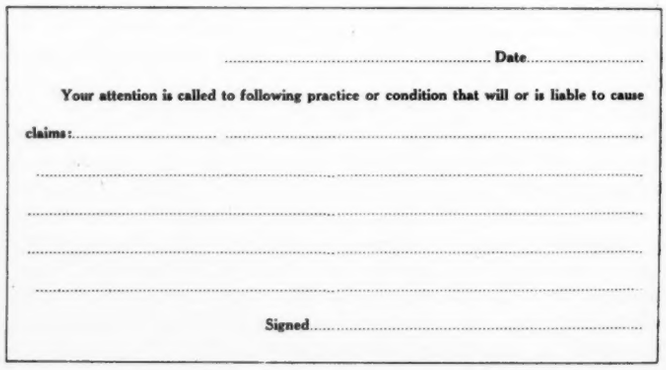
FRISCO LINES

The Address Side of the Special Postal

may be gained from the following figures covering the number received for each of the past four months:

November	1,860
December	1,780
January	1,743
February	2,520
Total	7,903

The number received in February is the largest for any one month to date, and is due to the greater interest which the employees are taking in the campaign. The minutes of the


Date.....

Your attention is called to following practice or condition that will or is liable to cause claims:.....

Signed.....

The "Business" Side of the Special Postal

Eastern Division Freight Claim Preventive Committee meeting, held at Springfield, Mo., January 6, 1915, indicate, for instance, that 67* of these cards were read and discussed. Following are a few extracts showing the sort of information that is often turned in on these cards:

C. L. Mikkelson, Conductor—Train 43 on November 26 had S. F. 31,480 out of Pacific loaded with merchandise from St. Louis. The car was not cleaned before loading with merchandise. Comment: This was handled with St. Louis for improvement in cleaning of cars before loading merchandise in them.

B. C. Barham, Conductor—S. F. 46,975, loaded with cattle, handled on October 3, one cow dead in car. This would not have happened if stock had been properly taken care of en route. Comment: Handled generally and with all concerned.

R. L. Herndon, Operator—Chadwick to Osceola, Mo., waybill No. 40, November 13, covers double marked household goods. Comment: Handled with Chadwick, who advises will have no further cause for complaint.

T. J. Sullivan, Special Agent—S. F. 32,303, loaded with wheat, arrived at Choteau avenue, 6:05 a. m., November 10, in train No. 32. Car leaking wheat along right-of-way. Was loaded at Springfield on October 28. Comment: Handled with the superintendent of terminals, Springfield, as to why such cars were furnished for tight loading.

*This is a rather low figure compared with other months.

F. D. Wrightsman, Conductor—Train No. 31, December 5, S. F. 94,332 and 93,801 loaded with street cars. These street cars were covered with canvas and were placed on head end of train where sparks from engine were liable to set fire to the canvas covering and damage the street cars. Comment: Handled with Newburg where cars were properly placed in the train.

W. W. Fitch, Engineer—New sill needed under freight-house door at Conway to prevent water running in on freight when it rains. Also two windows broken out of transom. Comment: Handled with general foreman bridge and building department, who had repairs made on December 15, 1914.

C. O. McCain, Agent—St. Louis, Broadway to Lebanon, waybill No. 563, December 1, S. F. 33,094. One sack of coffee loaded under freight for station west of Lebanon. Necessary to move all of the freight in the car to get at this shipment. Comment: Handled with Broadway station.

C. O. McCain, Agent—S. F. 29,590, loaded Broadway, St. Louis, December 4. Toe blocking and nails left in both doors. Comment: Handled with Broadway station, St. Louis, who advise person responsible has been told of his errors and promises to be more careful in the future.

W. S. Lea, Agent—Car LS & MS 86,535, loaded with merchandise out of Springfield had large hole in floor. Comment: Handled with Springfield station force, which has been instructed to watch matters of this kind and have them properly attended to before allowing cars to move out.

Springfield Terminal—Car No. 101,420 at Springfield platform, November 18. Part of the waybill for this car showed number of same as 10,142, instead of 101,420. Comment: Handled with the agent at Monett and transfer clerk claims pure oversight on his part and says he will watch these matters more closely in the future.

E. M. South, Conductor—S. F. 31,784, merchandise out of Newburgh on train 45, November 19. One brake beam gone and car not fit for merchandise loading. Comment: Handled with the mechanical department as to why no brake beam was on the car.

E. M. Frew, Agent—S. F. 125,761, merchandise car Broadway, St. Louis, November 12. Number of nails and spikes driven in the floor of the car. Comment: Handled with St. Louis, which in turn handled with the station force, giving men to understand that work of this kind would not be tolerated.

The minutes of the meeting indicate that 11 members of the freight claim preventive committee were present. There were 54 other persons present, including, in addition to the employees from the different departments a number of patrons of the road; among these were grocers, lumber men, harness men, a publisher, auto dealers, tailor, attorneys, bankers, farmers, etc. It is the purpose at all these meetings to invite shippers and patrons in order to interest them in helping to secure better results and to let them understand the care which the railroad employees are exercising to prevent loss and damage to freight.

It is the intention also to have freight claim preventive committees carefully inspect the facilities at the different points which they visit, and also study conditions as they travel. They are instructed to use local trains, where possible, in order to make constructive suggestions as to how this service may be improved. The division freight claim preventive committees have covered the entire Frisco Railroad on local freight trains, have talked to all the agents, checked the stations and held general meetings. This has required two solid days' work of each committee each month.

The following extract, taken from the minutes of a regular monthly meeting of the Western Division Freight Claim Committee, is of interest in this connection:

"Before departure from Beaumont Junction on Monday morning, the committee was divided into three sub-committees,* as follows: Grounds, station records, and merchandise. These committees on arrival at a station inspected the grounds, the cars in the yard, the station records and observed the handling of merchandise. On Tuesday, the 5th, the committee made a trip on a local freight train from Enid to Tulsa, inspecting station grounds, station records and observing the handling of merchandise. This meeting was the most successful the Western division has had. Not only was a great deal of enthusiasm aroused among the members of the committee, but they spread enthusiasm among all with whom they came in contact. Over 100 freight claim preventive post cards were turned in by the different sub-committees on this trip."

A few of the items mentioned on these postal cards and cards from other divisions may be worth consideration, as they differ somewhat from those which have been called attention to in connection with the Eastern Division Freight Claim Preventive Committee meeting, noted above.

S. W. Scudder, Fireman—Clinton Station had two freight trucks in bad condition for handling freight, having several holes in them. Comment: Trucks repaired.

Perry Skinner, Brakeman—Paper and stationery firms are shipping tablets and stationery weighing over 200 lb. in cases which should be reinforced with metal strips. Comment: Handled with Mr. Whitelam, who advises that this class of shipments will be watched particularly as to claims, and will be handled according to the results which develop.

Perry Skinner, Brakeman—Nearly all wholesale houses ship beans in sacks of 200 lb. each and use an inferior grade of sacks which split, scattering the beans. Comment: Referred to Mr. Whitelam, who advises that he will watch this class of shipments closely and handle with the shippers.

C. E. Jones, Brakeman—Run-way to stock pen at Cordell has holes in the floor which are liable to cause the stock to break their legs. Comment: Pens were repaired.

Anonymous—Called attention to agents leaving freight on platform several hours after departure of locals, subjecting it to theft or damage by the weather. Comment: Circular issued to all agents calling their attention to this practice and instructing them to discontinue it.

R. C. Meador—S. F. 123,755, sacked oats loaded against harrow which resulted in hole being worn in sacks. Case of improper loading on part of Oklahoma City. Comment: Matter called to attention of warehouse force at Oklahoma City. Has been handled with foreman personally and an item placed on bulletin board for inspection of all freight men.

J. H. Hammond, Switchman—"If some engineers would take more care in stopping and starting at the Iron Mountain crossing at Tower Grove, I think that it would save freight claims." Comment: Superintendent is handling; it has developed that some engineers use only driver brake and not the air brakes.

R. C. Meador—Merchandise car doors are left open on platform at noon, Afton. No one in charge. Think there should be a man left in charge or doors closed and avoid chance for pilferage. Comment: Matter called to attention of agent at Afton who has put a stop to the practice.

STATISTICS

Another factor which is helping to secure results is the monthly statement of damages at stations. The different stations are divided into groups according to the amount of business which they handle. For instance, Group 1 consists of

The Blackboard at the Hugo Freight Station

Springfield, Monett, Kansas City, St. Louis, Seventh street, St. Louis; Broadway and Memphis. The statements show the total number of shipments handled in each place, the number of damages and the number of shipments loaded to each damage. These statements are discussed at the various meetings at local points, and there is considerable rivalry in the attempt to head

*This is the regular practice for all of the division committees.

the list. At one place, Hugo, which heads Group 2, a large blackboard in the freight station reproduces the data for Group 2 and every man at that place is working hard to keep Hugo at the head of the group. That they are being successful is indicated by the fact that during February not a single error in billing or handling freight was made at Hugo, although 2,382 tickets were billed and 8,074 shipments were handled. This is the first time in the history of the Frisco that a station the size of Hugo has gone through a whole month without being charged with a single mistake. A photograph is shown of the blackboard, as it appeared in October, but the two tables included on it are not very clear and are therefore separately reproduced, as follows:

Statement Showing Total Number of Errors Made at Stations in Group 2, September, 1914. Also Number of Tickets Billed to Number of Billing Errors and Number of Shipments Handled Over Platform (Outbound) to Number of Loading Errors

Stations	Error billing	Error handling	Mishandling waybills	Total	No. tickets billed	No. tickets handled to each error billing	Shipments handled	No. shipments handled to each error
Hugo	2	4	..	6	2,513	1,256	8,206	2,051
Sapulpa	2	10	5	17	1,553	776	14,931	1,493
Tulsa	1	10	1	12	4,645	4,645	8,357	836
Oklahoma City.	10	22	..	32	11,921	1,192	14,333	651
Birmingham ..	6	12	..	18	5,755	959	7,288	607
Ft. Smith	13	26	..	39	6,051	465	10,359	398

Failures to unload and mishandling waybills not included in above averages.

Damages on Stations (Group 2)—September, 1914

Stations	No. shipments handled	No. damages straight cars	No. shipments loaded to each damage
Hugo	8,206	2	4,103
Ft. Smith	10,359	11	942
Birmingham	7,288	9	810
Oklahoma City	14,333	27	531
Sapulpa	14,931	29	515
Tulsa	8,357	21	398

It should be clearly understood that while the committees cover the different points on the division, the terminals; i. e., St. Louis, Memphis, Springfield and Kansas City, which have terminal superintendents, have freight claim preventive committees of their own and hold regular monthly meetings.

The Central Committee is made up as follows: E. D. Levy, general manager, chairman; J. E. Hutchinson, general superintendent; J. A. Frates, general superintendent; P. T. Dunlop, general superintendent motive power; R. W. Schulze, superintendent car department; W. H. V. Rosing, special engineer; T. B. Coppage, superintendent transportation; J. H. Doggrell, assistant superintendent transportation; J. H. Smith, chief special agent; E. C. Lilley, inspector of transportation and station service; W. E. Ogston, superintendent Frisco Refrigerator Line, and G. E. Whitelam, superintendent of freight loss and damage claims. Mr. Whitelam is secretary.

It was estimated that about $9,000 would be required to cover compensation to committeemen and traveling expenses for the first year's operation of the freight claim preventive committees. The division committees hold meetings monthly, but this interval will be made greater as the work becomes more fully developed. The time of meetings varies with local conditions and the convenience of the committee. Some are held in the evening; others at various times during the day.

There is one important factor which thus far has only been lightly touched upon and which in a large degree is doubtless responsible for the record which has been made. That is the ingenious devices which have been developed for keeping all concerned fully posted as to the progress of the campaign and in holding their interest to a high pitch. Not a week elapses but what something in the way of a bulletin, a reminder, a terse comment, a comprehensive diagram or a cleverly worded poster is sent broadcast over the system. The more important devices of this sort will be considered in Part III of this article, which will appear in next week's issue.

STRONG CLAIMS FOR CHILLED IRON CAR WHEELS

In a paper presented before the Richmond Railway Club, April 12, 1915, F. K. Vial, chief engineer of the Griffin Wheel Company, Chicago, made some very strong statements with reference to the superiority of chilled iron over steel car wheels. The following is taken from the summary of the paper:

"Collecting the various items, we have a saving of over $37,000,000 in the annual expenditures of the railroads of the United States when chilled iron wheels are used instead of steel wheels.

"It has been shown that the railroads cannot purchase immunity from accidents by the expenditure of tens of millions of dollars annually as a premium for steel wheels. It has been shown that there are many fundamental physical properties of chilled iron which are favorable to wheel requirements, that cannot be duplicated by steel. There are many properties of steel that do not harmonize with wheel requirements, that do not exist in chilled iron. It is, therefore, imperative that the fundamental laws of wheel design and the relation of chilled iron to service conditions be thoroughly established.

"A vast amount of work has been done in studying the peculiarities of steel rails in service, and the same line of investigation should be made with reference to wheels. The fundamentals of flange design are well established by the Association of Manufacturers of Chilled Car Wheels, but are not accepted by the M. C. B. standing committee on car wheels, and nothing is given in their place. The relation of the plate of the wheel to heat stresses is also fairly well established by the manufacturers, but is not yet accepted by the M. C. B. wheel committee.

"Notwithstanding the fact that nearly all breakages of wheels in service are caused by heat stresses, no study has ever been made by the wheel committee to classify railway equipment with respect to its braking power, which is the measure of heat generated in the wheel when operating on grades; neither do their specifications refer in any way to heat stresses, which are of greater magnitude than those arising from any other cause. It has been necessary for the wheel manufacturers to establish their own rules for wheels designed for heavy duty, which are based on wide observations at points of maximum service and also on tests made at Purdue University, showing the magnitude of heat stresses developed in wheels of various designs under various brake pressures. These rules have proved to be absolutely reliable and chilled iron wheels are now in use under loads exceeding 200,000 lb. In fact, there is far less trouble in the use of chilled iron wheels under maximum loads on maximum grades when designed according to well established rules than now occurs in the lightest capacity cars using the M. C. B. standards.

"The chilled iron wheel is especially serviceable in passenger service on account of the comparatively light loads carried and the freedom from tread failures such as occur in steel wheels. The difficulty in passenger service has been that only the lightest wheel manufactured, of the chilled iron variety, has ever been used. In fact, in the case of all-steel coaches using chilled iron wheels, the 625 lb. chilled iron wheel is used; when steel wheels are used, however, under the same coaches, they weigh above 1,000 lb. Notwithstanding the large percentage of chilled iron wheels in passenger service, it is only recently that the standardization of design for this service has been presented to the various railroad companies, and it would not be at all surprising if a return were made to the chilled iron wheel for exclusive passenger service.

"There is no question regarding the superiority of chilled iron wheels for the heaviest tender service, whether for passenger or freight; in fact, there is no field of wheel service where chilled iron is not preferable to any other material. It has all the possibilities for making a perfect wheel; all that remains is to establish the proper design and proper method of manufacture."

Hearings in Western Freight Rate Advance Case

Useless Questions Asked by Mr. Thorne. The High Cost of Carrying Live Stock and Useless Attendants

The western railways completed the introduction of their evidence in the western rate advance case being heard in Chicago before Commissioner Daniels, on April 8, after five days had been allotted to them for the presentation of testimony which they were not able to complete in the time scheduled for it last month.

At the close of the railroads' side of the case Clifford Thorne of the Iowa Railroad Commission filed with the commission a list of 36 interrogatories calling for information to be furnished by the railways as to the disposition of railroad revenues during recent years, specific data on certain operating costs and a complete exposition of the financial history of the railroads in the case.

One interrogatory reads: "State what sums have been expended in raising the standard of your property or in making improvements, additions or extensions which have been charged to operating expenses during each of the fiscal years 1901 to 1904, inclusive. Another interrogatory asked for a list of all directors, officers and employees who received salaries of $10,000 or more per annum during the last fiscal year. Another asked for information regarding "payments made for influencing legislatures, assisting political campaigns, special legal services, entertainments of public officials or influencing public opinion through the press during the period 1907 to 1914, inclusive."

Information was also asked as to the charges to road and equipment for the period covered by the carriers' exhibits, property acquired during the same period, life of ties, fuel consumption, purchasing data and sleeping car contracts.

The questions relating to the financial operations include queries concerning sources of money charged to road and equipment, non-railroad property held, security issues, securities retired or converted and intercorporate holdings, the amount of unproductive expenditures for permanent improvements, whether made voluntarily or in compliance with governmental requirements, since 1901, and the amount of unproductive expenditures for other than permanent improvements.

Mr. Thorne also asked that President Bush of the Missouri Pacific and President Felton of the Chicago Great Western, be recalled for further examination.

A vigorous protest against this wholesale demand for information was filed with the commission by C. C. Wright, chairman of the committee representing the railways. Mr. Wright stated that similar questions had been put to the carriers in the eastern rate case, and the information was not used after the roads had been put to tremendous expense in compiling it, and the case had been delayed for months; and that while the questions would be proper in a general investigation of railway management they were out of place in the present case. Moreover, he said, the request comes too late in the case and is unnecessary, as all books and records of the carriers have been open to the shippers from the beginning.

"The record of this case disclosed," he said, "that from time to time the representatives of the state commissions have asked for information of a most general and extensive character, which the carriers have either furnished or are preparing for them. The expense incident to requests already made has been very great and the expense of the present requests would be large. The carriers are ready to undertake anything which may be deemed material to a full and fair presentation of the propriety of the rates suspended in I. & S. Docket 555, but are unwilling to further gratify the curiosity of the complainants in matters which do not bear upon the issue before the commission."

Representatives of the protestants on April 9 and 10, presented their evidence in opposition to the proposed advances in the rates on hay and broom corn, and they will have until May 10, to present their evidence bearing on the rates on specific commodities, and uncompleted testimony bearing on financial conditions.

CONCLUDING TESTIMONY OF CARRIERS

The uncompleted testimony of the railroads was devoted mainly to the proposed advances in rates on livestock and packinghouse products. A large number of operating officers were called to testify as to the unusual expenses attending the handling of this traffic.

C. E. Spens, assistant freight traffic manager of the Chicago, Burlington & Quincy, testified that in 1914 the Burlington furnished free transportation for 79,484 caretakers of livestock, representing free transportation amounting to $419,093, or 7.8 per cent of the revenue from livestock. Mr. Thorne asked how many attendants are carried in the bunk cars. "The number varies with the attractions of the great city of Chicago," replied Mr. Spens. "These caretakers relieve the railroad of a great deal of work, don't they?" asked Mr. Thorne. "They are supposed to," answered the witness.

C. Haile, vice-president of the Missouri, Kansas & Texas, testified that rates on livestock have always been regarded as too low in comparison with other articles comprising the bulk of the tonnage and considering the extraordinary expense and unusual conditions surrounding the traffic.

"This commodity," he said, "is of a perishable nature, with liability for heavy claims for damages; extreme promptness is necessary in reaching markets; free transportation both ways must be accorded caretakers, and the carrier is liable for damages for injuries to the caretakers while en route. Loading of cars and trains carrying livestock is very light, the paying weight being not above 40 per cent of the gross weight hauled, against 50 per cent on other commodities. Special facilities are required for the exclusive use of this traffic, such as pens and chutes, and special side tracks must be built and maintained. The cars must be bedded at the carriers' expense in the Southwest and under the law the stock must be unloaded, rested, watered and fed at least every 36 hours. Cars must be cleaned and disinfected under state and federal regulations, and cars used for livestock are available for loading only a few other commodities. For this reason the empty mileage of stock cars is excessive. On the Missouri, Kansas & Texas the empty haul of stock cars is about 97 per cent of the loaded haul, while the empty mileage on all box freight cars is only about 27 per cent of the loaded mileage. On our railway the average earnings per car on livestock are only $29.81 against an average of $42.07 per car on all other carload freight, excluding livestock. In fact, out of 43 commodities livestock shows lower earnings per car mile than any other, excepting rice, flour and other mill products, on which advances also are asked.

"Owing to the perishable nature of the freight and the necessity of reaching markets at specified hours, unusual expedition is required in the movement as compared with other freight, resulting in reduction of the tonnage of trains hauling livestock as compared with trains made up wholly of non-perishable freight. Excessive claims must be paid in the handling of livestock traffic as compared with other freight. The proportion of total claims paid, excluding livestock, to total freight earnings, was 2.63 per cent. The proportion of livestock claims paid to total livestock earnings was 10.41 per cent, or about four times as great. Damages per car on livestock were $3.10 against average earnings per carload of only $29.81." Mr. Haile submitted figures showing that on six roads, operating 44 per cent of the entire mileage interested, the new revenue which would accrue from livestock would be $645,709. If the same ratio were applied on other mileage the total would be less than $1,500,000 per year.

J. A. Somerville, superintendent of transportation of the Mis-

souri Pacific, described the operating difficulties in the handling of live stock trains. "Livestock business," he said, "is more expensive than the general run of traffic because we are obliged to maintain schedules with a view of reasonable loading time for the shipper, while reaching the market within specified hours and within the time limits set by federal laws. Livestock reduces the tonnage of trains. Observations we have made show that stock trains carry only 51 per cent of the engine's capacity, while through trains not handling livestock carry 91 per cent. The empty movement of stock cars ranges from 67.7 per cent to 97 per cent of the loaded, against 24.1 per cent to 31 per cent on box cars. Excessive empty mileage results from special equipment in which livestock is handled, which cannot be loaded to any material extent in both directions."

The witness then presented schedules prevailing on stock trains, showing that they range from 14½ to 18½ miles an hour, against 10 to 13½ miles per hour on ordinary time freight trains and against 10 miles an hour on ordinary freight. On branch lines and in pick-up service, under which stock is concentrated at junction or division points, he said schedules must be maintained to make proper connections with through trains. Otherwise additional expense for further fast movement in special trains is necessary, instead of regular trains to market points.

G. B. Vilas, general superintendent, Chicago & North Western, showed that free transportation accorded livestock shippers is used extensively by persons neither owners of livestock nor employees of owners, but who travel on someone else's contract.

"In January alone on the North Western," he said, "we furnished on a passenger rate basis $20,475.80 of transportation from shipping point to the market and return. In a year this would amount to $245,000 passenger transportation, on account of the livestock movement.

There is no real necessity for attendants. An actual check for five weeks showed that out of 3,164 such attendants, only 2,033 were actual owners, 231 were employees of owners, while 900 were neither employees nor owners. We paid last year in claims $4,005 on account of attendants being injured and claims amounting to $3,000 more are pending.

"The value of livestock facilities on the North Western is $1,428,000 and the yearly maintenance cost is $74,775. Last month we spent $7,910 disinfecting and cleaning stock yards and the federal authorities have ordered us to do it all over again, because of the cattle infection. Cleaning and disinfecting stock cars costs $2.50 each and often results in a delay of from 24 to 48 hours when the car is needed badly. When the market price of livestock goes up during the week, we receive orders for empty cars, rush them to the loading territory in special trains and then if on Saturday the market drops, the cars are not shipped and we have been put to useless expense running them out at high speed, when they are not used for a week or two.

O. C. Smith, superintendent of transportation, Missouri, Kansas & Texas, and C. B. Strohm, superintendent transportation, Atchison, Topeka & Santa Fe, presented similar testimony.

J. R. Koontz, general freight agent of the Santa Fe, said that livestock pays the least per gross ton mile of any commodity carried. "On a typical run from a southwestern point to Chicago," he said, "the earnings on livestock are only 2.13 mills per gross ton mile, including the empty returns, and 3.22 mills excluding the empty returns. The average carload is only 11.61 tons. To mention only a few other commodities in this same territory, eggs make an average carload of 13.04 tons and earn 6.83 mills per gross ton mile, excluding empty returns; cotton loads 12.16 tons and earns 4.63 mills; beans load 20.46 tons and earn 5.50 mills; poultry loads 9 tons and earns 6.73 mills; agricultural implements load 14.42 tons and earn 6.36 mills; stoves load 16.06 tons and earn 6.81 mills, while structural iron loads 28.62 tons and earns 7.15 mills. Yet loss and damage claims are higher than on any other commodity. Livestock revenue is only 5.7 per cent of total freight revenue, yet the claims paid on livestock are 17.9 per cent of the total claims paid on all commodities, or over three times the proportion of revenue."

N. D. Ballantine, assistant to second vice-president of the Chicago, Rock Island & Pacific, presented figures covering tests made on the Rock Island, which showed that on trains carrying livestock, either exclusively or in part, only 63.9 per cent of the locomotive capacity was utilized, while on trains carrying other freight, 71.1 per cent was utilized. "Had we been able to carry as much tonnage on stock trains as on trains carrying other commodities," said Mr. Ballantine, "we would have saved 2,822 train-miles on the trains investigated, yet this was on divisions where we got the maximum benefit from concentration of livestock traffic, and as we get away from the territory covered, we would get an even small equalization.

"The increased cost of fast freight train service demanded by livestock traffic, as against slow freight service, is shown by the fact that by actual tests where the average speed between terminals was increased 12 per cent, the fuel consumption increased 30 per cent per gross ton mile and the cost of fuel, wages, water, lubricants, repairs, interest and depreciation on locomotive and caboose increased 24 per cent. In a test with another class of locomotive, equipped with superheaters, where the speed was increased 49 per cent, the fuel expense increased 32 per cent and the total expense 11.49 per cent."

S. B. Fisher, chairman of the valuation committee of the Missouri, Kansas & Texas, testified as to the cost of special facilities on his railway, required by the livestock traffic, including lands, tracks, chutes, pens and appurtenances. He showed that the original cost to date of these special facilities reached $688,617. The cost of reproduction new would be $1,017,692, while the cost of reproduction new, less depreciation, would be $784,050.

TESTIMONY OF SHIPPERS ON ADVANCED RATES

Clinton R. Lee, president of the Lee Broom Company and chairman of the board of governors of the National Broom Manufacturers' Association, testified in opposition to the proposed advance in rates on broom corn, saying the manufacture of brooms is conducted on a decreasing margin of profit which will not permit of the absorption of added freight rates, and that the industry has already more than borne its share of the transportation burden by advances in rates in recent years.

C. A. Steel, traffic manager of the National Broom Corn Manufacturers' Association, testified that the existing rates on broom corn are sufficiently remunerative to the carriers. He said that the rates now in effect from 25 representative shipping points in the states principally affected average 54.4 cents per 100 lb. for the average haul and give an average revenue per car of $97.77, or 13.8 cents per car mile.

C. W. Hillman testified as an expert accountant for the protesting state railway commissions, that broom corn instead of failing to pay its proper share of the burden of transportation, shows a very favorable return when contrasted with the rates on other commodities. He presented data covering the movement of 261 cars, moving during October and November, 1914, to show that the average earnings per car were $116.94, and per car mile $16.36, and per ton mile 15.44 mills. He said there were no special costs incident to the broom corn traffic other than its comparatively light loading as compared with other carload freight.

Testimony against the proposed advance in rates on cotton piece goods was presented on Monday, and for a time the room in which the hearing was conducted took on the appearance of a large dry goods store. S. H. Johnson, assistant freight traffic manager of the Rock Island Lines, in his testimony had presented a list of the principal articles included under the head of cotton piece goods, with the high and low prices for each article, making an average of $65 per 100 lb. Leon Smith, president of the Smith-McCord-Townsend Dry Goods Company of Kansas City, before taking the stand had spread out on tables before the commission the contents of two large packing cases of dry goods, saying he had "filled Mr. Johnson's order," and that the value was only $27.65, instead of $65. He said that the prices

as given by Mr. Johnson not only were too high but that they represented an average of the high and low extremes in prices, whereas the great volume of shipments to the Missouri river was made up of articles priced much lower than Mr. Johnson's figures. The effect of the testimony was to show that a freight rate of 40 cents per 100 lb. for the 300 mile haul between the Mississippi and Missouri rivers, represented 1.5 per cent instead of 0.6 per cent, as stated by Mr. Johnson, of the value of a 100 lb. shipment. The proposed advance is 5 cents per 100 lb.

Other testimony was given by J. I. Sweeney, traffic manager of the Smith-McCord-Townsend Dry Goods Company, Thomas Byrne, a dry goods jobber of Omaha, and J. C. Saunders of Bonham, Tex. Mr. Byrne protested that the advance would have a serious effect on his business. T. J. Norton, attorney for the Atchison, Topeka & Santa Fe, asked the witness what percentage the advance in rates would bear to his profit. When objection to this question was raised by counsel for the shippers and the witness refused to give the amount of his profits, Commissioner Daniels said he need not answer the question but that his refusal must be taken into consideration with his testimony that the increase in rates would be a burden.

INDUSTRIAL COMMISSION INVESTIGATES 1911 STRIKE

An investigation of the strike of the labor unions in the mechanical department of the Illinois Central and the Harriman Lines, which was declared in September, 1911, was taken up by the federal commission on industrial relations at a hearing at Chicago beginning on April 7. Charles H. Markham, president of the Illinois Central, was the first witness and occupied the stand almost the entire day. He presented a 70-page typewritten statement outlining the history of the strike and the events that led up to it. This strike, Mr. Markham said, was as ill-advised and inopportune as it was unexpected, and grew out of no real or substantial grievance. Within the year the company had granted large increases of pay to the mechanical department employees and no request for an advance in wages was involved. He said the company refused to recognize the new system federation because contracts were in force with the individual unions, and no 30-day notice was given, as required in the agreement, that it was desired to terminate the existing contract. He also said that the strike grew out of an attempt of the American Federation of Labor to organize the shop crafts on each railroad system and that the railroads opposed the movement in principle. He said the company objected to having men outside of its service who were leaders in the organization of the federation interfere in the affairs of the company, and that it objected to having its labor situation complicated with labor troubles which might exist in shops outside of the railroad service, which would be the result of the system federation plan.

Chairman Walsh asked if it was not a fact that at the time the strike was called 31 railroads were dealing with the federation and that now 52 railroads recognize the federation. "I don't know," replied Mr. Markham. "May I say that if that be true they will be sorry for it?" Asked why, if it was a good thing that railroads should be organized into large corporations, the same proposition did not apply to labor organizations, Mr. Markham said that the consolidations of railroad corporations made it possible to give better and more efficient service to the public, but that labor unions were not organized for that purpose, and that the federation plan placed too much power in the hands of labor leaders. He said the strike had cost the Illinois Central millions of dollars, but that the road had replaced the strikers and that its shop work was now being carried on just as efficiently, if not more so, and at a slightly less cost than before. Mr. Markham said he had no objection to the railroad brotherhoods, but that the mechanical unions had shown they could not be depended upon to live up to contracts; and he considered unions which combined railroad men and men employed outside of railroad service a menace.

A. O. Wharton, president of the railway employees' department of the American Federation of Labor, and a number of other witnesses who had participated in the strike, defended the federation plan of organization of the mechanical department employees. Other union officers and organizers said that the strike on the Harriman lines had been caused by discriminations and arbitrary methods of dealing with the men, including the employment of "spotters" and efforts to break up the unions. Several of the witnesses testified that E. H. Harriman, after settling the Union Pacific strike in 1904, had said that the ideal way to handle such questions would be to deal with an organization representing the entire system, instead of taking up the time of both sides in dealing individually with smaller organizations. They said they felt they had taken his advice in organizing the system federation of the mechanical department unions, and that if Harriman had lived the difficulty would have been avoided. Various witnesses put into the record results of an investigation of the effects of the strike on the men engaged in it; the number who had been obliged to give up their homes and take their children out of school, etc.

Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific, testified on April 10, giving a comprehensive review of the events and causes leading up to the strike. The principal reason of the railways for opposing the demands of the men, he said, was the proposition to establish the system federation plan for the entire Harriman system. This would involve, he said, a recognition of the rights of outsiders to negotiate agreements for the employees. Asked by one of the commissioners what he would suggest for the alleviation of industrial unrest, Mr. Kruttschnitt said that complete publicity for labor controversies is one of the best methods of maintaining industrial peace. "I have observed that no strike succeeds with public opinion against it," he said, "and as I grow older I am more fully convinced than ever that the public should be fully informed on exactly what the issues are. The judgment of the public will be almost always right."

The commission's investigation of wages and conditions of employment of Pullman conductors and porters was interrupted on April 6 by the failure of Chairman Robert T. Lincoln and President John S. Runnells, to appear to testify. Both sent messages asking to be excused on account of ill health.

A number of porters were called as witnesses and testified that they were satisfied with the condition of their employment. R. W. Bell, a former Pullman conductor, said he had been discharged for activity in trying to organize the conductors, and other former employees of the company complained about the conditions and the wages.

On Monday of this week the commission took up the investigation of conditions of employment of the Western Union Telegraph Company.

Ratio of Trainmen Killed.—Statistics prepared by the Interstate Commerce Commission show that in a given year for every 208 trainmen employed in the United States, one was killed and for every 8 employed one was injured. I am afraid a good many of us do not appreciate these figures. Suppose as an illustration the name of every trainman on your division should be taken, these names put on separate slips of paper, these slips put in a hat and you all knew that for each 208 names, one would be drawn from that hat one year from today and the man bearing that name would be taken out and shot. How many of you would remain in the service and take the risk of having your name drawn? This is just what it means, so far as life and death is concerned, except that the man would have a full year to live, whereas in accordance with actual conditions he may be killed today. We are too secure in our belief that it is the other fellow who is careless.—*E. H. Daniel in the Railroad Herald.*

IMPORTANT DECISION IN THE ARKANSAS RATE CASE

On April 3 the United States District Court for the Western division of the Eastern district of Arkansas handed down a decision in the suit of the State Railroad Commission against the St. Louis & San Francisco to enjoin the enforcement of a freight tariff promulgated by the State Railroad Commission and also the 2 cent passenger rate established by the state legislature in 1907. The court declared these rates confiscatory and granted a perpetual injunction to the railroad. The railroad's case was based on a division of expenses made according to the "Oklahoma formula," and the court upheld this formula.

The original bill in this suit was filed in July, 1908. A temporary injunction was granted and a new tariff for freight rates adopted under the supervision of the court, which raised the freight rates above those established by the tariff enjoined and restored the passenger rate of 3 cents a mile. In 1909 an agreement was made between the state and the railroad that the hearing of the case be postponed until the final determination of similar actions instituted by the St. Louis, Iron Mountain & Southern, and the St. Louis Southwestern, and a further stipulation that the company should make a test of the passenger rate at 2½ cents per mile for the purpose of determining what the effect of such a rate would be on the net earnings of the company. The company reduced the intrastate passenger rate to 2½ cents per mile for 18 months in 1909 and 1910, and then restored the 3 cent rate, claiming that the test showed that the rate was not remunerative. On June 16, 1913, a decision was rendered in the Iron Mountain and the Cotton Belt cases, holding that sufficient proof was not presented to justify the court in overruling the action of the state, and the bills were dismissed. On the preceding week the opinion in the Minnesota rate case was filed.

Following these decisions representatives of a number of Western roads devised a formula for the purpose of dividing valuations and expenses between intrastate and interstate and between freight and passenger traffic upon the basis of the use made of the property by each class as suggested by the Supreme court, for special use in the Oklahoma rate case. This formula, which was described in the *Railway Age Gazette* of July 3 and July 24, 1914, was amended to meet the conditions prevailing on the Frisco lines in Arkansas, and was submitted by the road as a basis for its contentions.

As no separate records had previously been kept by this or any other company on this basis, it was necessary to collect special data. This was done for all the lines of the Frisco in the state of Arkansas during November and December, 1913. Printed forms were prepared by the company and distributed among the employees, on which they were required to report every item of expense and the use made thereof for freight or passenger and for intrastate or interstate traffic. To obtain this information clerks were placed on every train running in Arkansas during this period. Special yard clerks were placed at the termini of all through freight runs to record the contents of the trains and when they arrived and left. Conductors in charge of freight trains were required to record the character and quantity of feight, the distance hauled and the amount picked up and set out at each intermediate station. For passenger traffic a division of expense was made on the "car foot mile" basis, the measurement of the space assigned in each car to each class of service being multiplied by the number of miles that car ran in Arkansas.

In a similar way the time devoted by yard engines to the various classes of service and the time of yard and station agents' work was classified. To allocate maintenance of way expenses, experienced men were sent over the road who instructed the section foremen regarding the methods of keeping accounts and who classified every track under the charge of each foreman according to its use as a line or terminal track or common to both. If used exclusively for freight or passenger traffic it was likewise again classified. A similar method was applied to bridges, buildings and other structures. Terminal charges were localized to the state where the terminal was located and each individual yard was treated separately.

The expenses of intrastate passenger traffic were divided between intrastate passenger miles actually determined within that period and the cost per passenger mile for all expenses by this method arrived at. The same method was followed for the interstate traffic and thus the excess cost relation of the work determined. The cost of the intrastate passenger business based on the use of the property was found to be 15.43 per cent more than that of the interstate, and for the freight service the intrastate cost was found to be 319.58 per cent greater than the through.

Comparisons were made with the test period commencing with the year ending June 30, 1913, and working back to the last four months of 1907, which showed that the test period was practically the same as that for the preceding years.

Although the state contested this method of comparison the court decided that "this method of equation will secure results as nearly correct as is possible when no separate accounts of the two classes of traffic have been kept." While the state attacked the formula as incorrect, it presented no better one and all its exhibits were based on the formulae used by the company. The state did not separate the Arkansas business from that of the entire system, assuming that there was no difference in the cost of operation, in spite of the fact that the traffic density in Arkansas was shown to be considerably less than that on the system as a whole, the lines of heavier grades and less favorable operating conditions, and the length of haul of the intrastate traffic much shorter than that of the entire system.

After the hearing began the average value of the property for the years 1910-13, inclusive, was stipulated by agreement as $17,924,441.75, the value fixed by the state taxing board, and the average annual gross earnings in the state were shown to be $4,172,121.71. Had the freight and passenger tariffs of the state commission in question been enforced during this period these returns would have been $456,103.72 less. Deducting this difference the company claimed that there would have been an actual loss on the intrastate business for these four years of $122,651.26, while upon the entire business in the state, intra and interstate, the company earned a net profit of 5.63 per cent.

The state contended that the reduced passenger rate of 2 cents a mile would stimulate traffic to such an extent that the intrastate business would gain. The company charged 3 cents per mile for interstate business, and to ascertain the effect of the reduced intrastate fare a test was made for the month of August, 1913, which showed that while the intrastate business increased it did so because many passengers bought tickets to the state line and then to destination. The court found therefore that the two-cent rate did not stimulate traffic except at the expense of the interstate.

The court found that the average annual net earnings of the Frisco lines in Arkansas from all sources were $1,122,463.21 for the four years 1910-1913, inclusive, yielding a net return of 6.26 per cent on the agreed valuation. Adopting the same basis for the intrastate traffic, the profit on the valuation of the road assigned to intrastate business would be $198,249.25. Deducting the decrease which would have resulted if the enjoined rates had been charged there would have remained a net profit from intrastate traffic of $84,223.32, equivalent to 2.65 per cent on the valuation of $3,166,921 allocated to the intrastate traffic according to its use.

As no claim was made for the state, and no evidence introduced to show that the road is not properly and economically managed, or that it was not built to meet a public demand, the court granted a decree making the temporary injunction, preventing the enforcement of these rates, perpetual but retaining jurisdiction so that the state may apply for further orders to meet new conditions should they change.

One of the reasons why this decision is of special importance is that this Oklahoma formula is being used by the railways as the basis for important rate cases now being contested in Texas, Kansas and Oklahoma.

CHAPEL CARS FOR CHURCH EXTENSION WORK

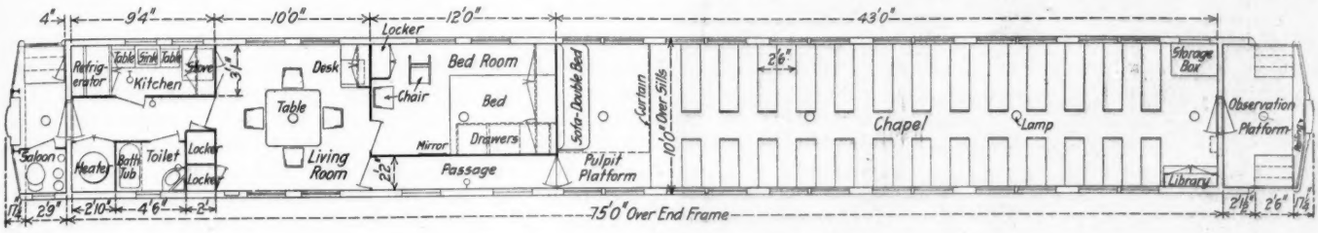
The Barney & Smith Car Company, Dayton, Ohio, recently completed a chapel car for the Catholic Church Extension Society of the United States and one for the American Baptist Publication Society.

The former, which is named the "St. Paul," is 86 ft. long over all, having an observation platform at each end. It weighs approximately 134,000 lb. The framing and exterior construction is entirely of steel and the roof is of copper. The interior finish throughout is in Cuban mahogany, of Barney & Smith design, executed in ecclesiastical Gothic lines. The car is equipped with two lighting systems, gas being used as a primary light, and electric light for an auxiliary. The car can be heated either by direct steam, or by means of an oil stove heating apparatus. There is seating capacity for about one hundred people.

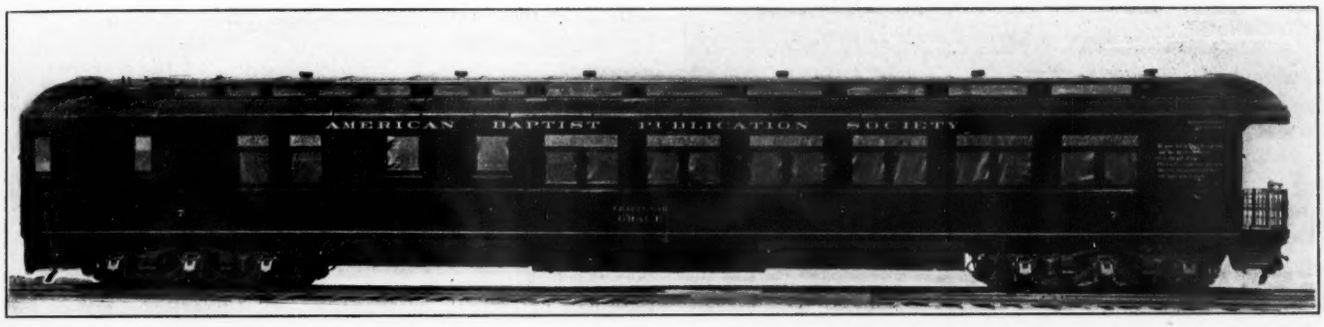
In addition to the chapel and altar, the car is equipped with private quarters for the chaplain, assistant and porter, as shown on the floor plan. Provision has also been made for toilet rooms, sleeping quarters, kitchen and pantry, and there is also a goodly supply of locker space.

The "St. Paul" was built for missionary work, and is intended for use in the Southern states exclusively.

The chapel car for the American Baptist Publication Society is 85 ft. 6 in. long over all, having an observation platform 4 ft. 4½ in. long at one end and a standard closed vestibule platform at the other end.

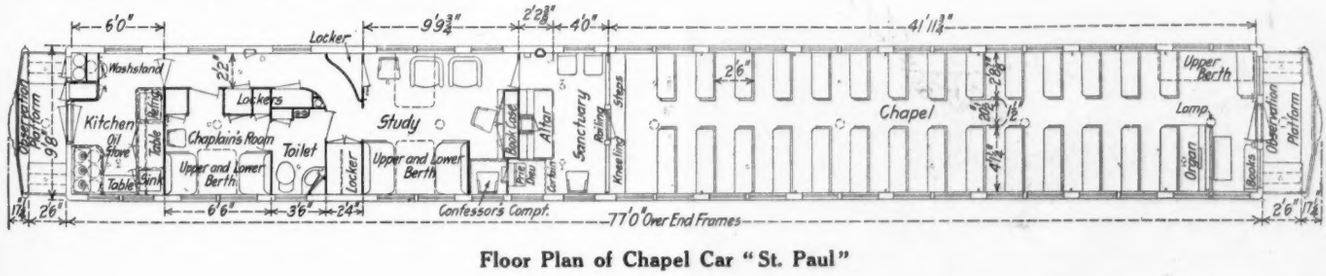


Floor Plan of the Baptist Chapel Car

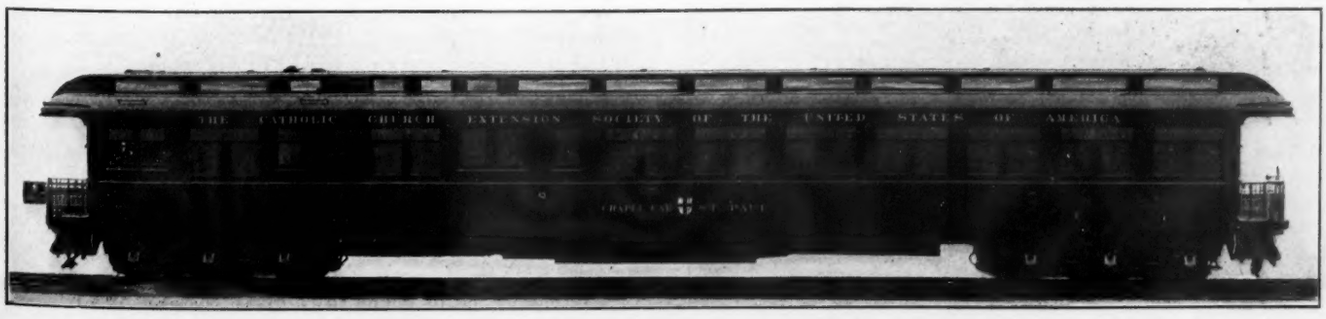


Chapel Car of the American Baptist Publication Society

The framing and exterior construction is entirely of steel, including the roof framing, the covering of which is of sheet steel. The interior finish throughout is in golden oak, executed in Gothic lines. The finish for the platforms is in flat steel, painted and grained. A raised pulpit platform is provided at the forward end of the chapel. The floor covering in the chapel is linoleum, with carpet aisle strips; for the bedroom, it is linoleum, with small rugs distributed about the room; for the living



Floor Plan of Chapel Car "St. Paul"



Chapel Car for the Catholic Church Extension Society

room, carpet is used; while linoleum is employed for the passageway, kitchen and toilet rooms. The seats in the chapel end of the car are reversible and of the regular day coach type,

An Interior View of the Baptist Chapel Car

finished in oak to harmonize with the interior finish. The total weight of the car is approximately 134,000 lb.

In addition to the chapel, the car is equipped with private quarters for the chaplain, a living room and library, kitchen, toilet rooms with bath, and lockers.

Interior of the Chapel Car "St. Paul," Looking Toward the Altar

The car, after a formal dedication and an exhibition trip from coast to coast, is to be used in the missionary field in sections of the country where no churches have been instituted.

THE CUMMINS AMENDMENT

The law of March 4, 1915 (Public No. 325), commonly called the Cummins Amendment, making changes in section 7 of the Interstate Commerce law (*Railway Age Gazette,* March 12, page 482) was the subject of a hearing before the Interstate Commerce Commission at Washington, on Saturday, April 10. The principal argument for the railroads was presented by O. E. Butterfield, of the New York Central, representing all the roads in Official Classification territory. The southern lines were represented by Lincoln Green, traffic manager of the Southern Railway, and C. J. Rixey; L. M. Walter appeared for various shipping interests, and H. C. Barlow represented the Chicago Association of Commerce.

R. B. Scott, of the Chicago, Burlington & Quincy, who appeared for roads in the western territory, said the roads did not expect to make a general increase in rates of 10 per cent, but that they desired to be heard further on the question of some increase in those rates which are now predicated on a restricted liability, for in some or all of these the liability of the carriers will be increased. H. G. Wilson, president of the National Industrial Traffic League, opposed any increase in rates, declaring that the present limited liability rates are the rightful rates for the unlimited liability provided under the Cummins bill, and that the effect of the bill is simply to wipe out the limitation of liability; it was not the intent of Congress to increase rates.

C. W. Stockton, speaking in behalf of the express companies, claimed that their tariffs and bills of lading are now so framed that the Cummins law imposes no additional duties; therefore, they had nothing to propose. W. H. Chandler, speaking for the Boston chamber of commerce, said that if the commission should insist on having the value of goods always stated in bills of lading for shipments sent by express many large shippers would be seriously embarrassed, for they ship at the lower rate now provided and depend on outside insurance companies to cover possible losses. They regard the higher rates of the express companies as optional insurance.

Mr. Rixey, for the southern lines, declared that the railroads might properly impose the ten per cent increase in rates, provided for by existing tariffs when a shipper declines to accept any of the conditions in the standard bill of lading; but that the roads in that territory, while not demanding all that they have a right to demand do propose to file tariffs making a five per cent increase; except that for livestock they propose to make a much larger increase.

This statement of the southern lines was the only definite proposal presented on behalf of the railroads except that of Mr. Butterfield. He, speaking for the eastern lines, went into the subject in considerable detail. Following are the main points of his argument:

He began by saying that, judging this matter by their experience in the conduct of affairs under strict governmental regulations, the railroads had attempted in good faith to interpret this law so as to place upon the carriers the full measure of the burden which it is believed was in the minds of its framers of the law, and at the same time to minimize as far as possible the burdens on the shipping public, which a strict construction of the words used by Congress might possibly be said to justify. In forbidding all stipulations as to value of goods this law neutralizes ten decisions of the Supreme Court, beginning with the Croninzer case in the 226th volume and ending with the Pierce case in the 236th.

The first point to be taken up is the uniform bill of lading. The section of the law which has now been amended requires (1) a receipt or bill of lading to be given; (2) imposes liability on the carrier; (3) prohibits exceptions from liability, and (4)

imposes liability regardless of the bill of lading. There is a proviso that if goods are hidden from view the carrier may demand a written statement of value; another that claims must be presented within four months, and a fourth, qualifying the last one, that this four months' limitation does not apply if the loss or damage was due to carelessness, etc.

Mr. Butterfield discussed the subject under seven heads, namely, (1) classification ratings not based on specified value; (2) export and import rates; (3) classification ratings based on specified value (household goods, ore, ostriches, paintings, quartz, silk, watches); (4) livestock; (5) commodity rates based on declared or assumed value; (6) lake and rail rates, uninsured; (7) baggage.

The present tariff rates are conditioned on the use of the standard bill of lading and all its condition. Except as these conditions may affect the value of goods, they are still valid, and the bill of lading may be used. The clause relating to settlement for goods lost or damaged says that the value is to be computed as of the time of shipment and at the place of shipment, with the provision, in parenthesis, that the value is to be "the bona fide invoice price, if any, to the consignee, including the freight charges, if prepaid." This parenthetical clause might be considered a limitation of liability, though the Interstate Commerce Commission in the case of Shaffer, 21 I. C. C. 8, held that it was not a limitation. However, the carriers propose to adopt a form of bill of lading with this left out. Continuing Mr. Butterfield said:

"We believe that if the commission shall be of opinion that the Cummins law condemns the 'place and time of shipment' clause, great confusion and probably unjust discrimination in the settlement of claims will result, and a substantial loss of revenue will be suffered by the carriers; and, while we do not expect an increase of ten per cent in all rates, we submit that some increase in the normal rates should be simultaneously permitted. Upon that point we would desire to be heard further if any such ruling should be contemplated. . . .

"The clause in the bill of lading providing for a notice of claims within four months was held in the Harriman case, 227 U. S., to be reasonable and apparently lawful, and, notwithstanding the Cummins law, may still operate upon claims for loss and damage for which the carrier is liable under the bill of lading although not caused by it, as, for example, loss and damage resulting from fire communicated to the property while in the carrier's possession but without the carrier's fault.

"We propose to amend this clause to read as follows:

"'Except in cases where the loss, damage, or injury complained of is due to delay or damage while being loaded or unloaded, or damaged in transit by carelessness or negligence. . . . . claims must be made in writing to the carrier at the point of delivery or at the point of origin within four months after delivery of the property, . . . or, in case of failure to make delivery, then within four months after a reasonable time, etc.

"It is the opinion of the carriers that this change will result in substantial loss of revenue, and they reserve the right to assert at the proper time a claim for some increase in rates on account of it. We have not the data which would enable us to make any intelligent statement of the extent to which revenue will be affected by that change."

The act does not apply to commerce with non-adjacent foreign countries unless the inland portion of the transportatoin crosses a state line, even if it does then; nor does Rule 1 of the classification apply the ten per cent clause on export rates when the terms of the export bill of lading are not used. The carriers propose to amend the notice clause in the export bill of lading to conform to the suggestions already made with respect to the uniform bill of lading.

As to household goods two rates are already provided. There seems to be nothing in the Cummins law to prevent the promulgation of these two rates, depending on values, provided they are reasonable. If the consignor fails to state the value it will be proper to charge him the higher rate; and while the statement of value, if he makes one, may not be conclusive against him in a suit to recover a greater amount, it will be evidence on the question of fact, and may subject him to criminal prosecution for false declaration.

The carriers propose to strike out the last part of the second paragraph of Section 3 of the conditions of the uniform bill of lading, the paragraph specifically condemned by the Cummins law.

Whether the carriers will continue to maintain rates based on valuation is a matter for further consideration by the traffic officers of the roads. As to all of the other commodities named, ores, ostriches, quartz, etc., the conditions are the same as in respect to household goods.

Livestock.—Livestock is shipped always under a special livestock contract, and this, if not revised, will increase all rates ten per cent. It is thought that there is nothing in the Cummins law to prevent a carrier from promulgating different rates for animals of different values, requiring the owner to specify the value for the purpose of fixing the rate, and declining to accept animals for transportation in case of failure on the part of the shipper to state the value; or, perhaps, imposing the highest rate in case of failure to secure a statement of the value. A misrepresentation of value would be evidence against the plaintiff in a suit to recover a greater sum and might subject him to criminal prosecution if he undertook to recover a greater sum. As to livestock the Cummins law does impose an increased burden. It is hoped that the carriers will be able to submit new tariffs prior to June 3; they are not yet prepared to do so.

Miscellaneous Commodities.—The commodities hereinbefore named are in the classification; now as to goods which are carried under special commodity rates there are 30 or 40 commodities on which two rates are named, one made lower than the other conditioned on various stipulations relating to valuation. For example, copper bars, Chicago to New York, go at 21 cents provided the value does not exceed $100 a ton. Others are, certain articles of furniture, a great variety of crockery and similar wares imported from Europe, liquors, imported printing paper, etc.

On all these rates the carriers are as yet unprepared to say whether or not the ten per cent increase, which they may take under the present tariffs, will be satisfactory.

On westbound lake-and-rail tariffs the railroads bear the cost of insurance; but on certain eastbound lake-and-rail traffic there is a clause exempting the carrier from liability in case of collision or stranding of vessels. This clause seems to be authorized by Section 3 of the act of February 13, 1893, Chap. 105, Vol. 111, U. S. Comp. Stat., 1901, p. 2946, and is not affected by the Cummins law (*"The Hoffmans,"* 171 Fed., 455, 464), where it seems to be held that it was not intended by the Carmack Amendment to overthrow the established law with respect to navigation.

Baggage.—Mr. Butterfield, citing the case of Hooker vs. Boston & Maine, 233 U. S., holds that Section 7 applies to baggage; and if so the Cummins law applies to baggage. Most baggage is hidden from view. Baggage tariffs already provide charges for baggage the value of which is more than the ordinary amount, and these tariffs have been approved by the commission. In some states it has been the practice for some time to call upon each passenger offering baggage to declare its value, if he wishes to do so. Under the new law it seems permissible unconditionally to require a statement. As to bicycles, baby carriages and other things not concealed, the carriers will have to make rates sufficient to cover their increased liability.

Argentine Railway to Borrow Twelve Million.—A report from London says that a special treasury consent has been granted to issue £2,500,000 ($12,500,000), Central Argentine Railway 5 per cent five-year notes of which amount £2,000,000 will be offered at 98. The funds secured through this issue will be required for the completion of construction work on the road.

AN IMPARTIAL STUDY OF FREIGHT-CAR DEMURRAGE

Bulletin No. 191 issued by the United States Department of Agriculture and dated March 19, entitled "Demurrage Information for Farmers," is an intelligent and thorough study of the subject, filling 25 pages. Copies can be had from the Government Printing Office at five cents each. It is issued from the "Office of Markets and Rural Organization," Charles J. Brand, chief, and is written by G. C. White, transportation specialist. The principal chapters are those headed Regulation by the States, Interstate Regulation, the Uniform Code, and "Reciprocal Demurrage." In twelve states demurrage is regulated by statute, and in 23 by orders of a commission. The peculiarities of the different state regulations are clearly set forth. An appendix gives a list of demurrage bureaus.

Following are extracts from this bulletin:

The average agreement in rule 9 is of no advantage to the farmer for the reason that he is shipping more than he receives. Its abolition would decrease car detention and thereby benefit the farmer as well as other car users. It is under attack from many quarters on the ground that it enables industries to detain unduly inbound cars of raw material on credits accrued on outbound cars of finished product, which are loaded to fill orders and would be loaded just as promptly in the absence of an average agreement.

The allowance of additional time for inspection and grading of grain and hay is necessary under conditions as they now exist, with different grades and standards effective in different cities and states. Grain is probably reconsigned more than any other one commodity and frequently must bear the burden of car delay in several markets. Instances are on record of its having moved through 15 different markets, in each of which it was subject to official inspection, before it was finally unloaded. This constitutes a serious burden on that commodity. Federal legislation fixing grades and standards for interstate shipments would undoubtedly render much of the present inspection and grading unnecessary. To that extent it would decrease the detention of cars now caused by frequent inspection and grading and thus relieve agriculture of one unnecessary burden.

"Reciprocal demurrage" has done away, to some extent, with the discrimination against the small shipper, in the furnishing of cars, as compared with the man controlling large tonnage. This has been of especial benefit to the farmer. In addition to enabling him to secure cars more promptly when needed, it has had a very powerful influence in awakening the conscience of the railroads to the needs of the farmer and in bringing the railroads to a fuller realization of the fact that their prosperity depends on the prosperity of their patrons. It must be admitted, however, that it is open to the objection of making possible collusion between carriers and shippers whereby carriers may pay rebates, or purchase routing, through the medium of failure to furnish cars on fictitious orders. Similarly the payment of demurrage has been avoided by collusion whereby cars have been set out in transit and held at intermediate points till consignees were ready to receive them.

Conclusions.—If in times of acute car shortage, the shipper who needs cars and is unable to get them could actually see all the other car users at all the other stations in his immediate section who are taking from two to seven days to load and unload cars, when it could and should be done in as many hours, no doubt there would be a speedy reformation among car users and a radical revision of some of the demurrage regulations now in effect. If his vision could be enlarged so as to take in the entire country the effect would be magical. Most, if not all, of the difficulties experienced in connection with car supply and car detention and the demurrage remedies proposed to alleviate the evils of car shortage have arisen from a lack of breadth of vision on the part of shippers, railroad officials, and legislators.

No car user has any moral right to detain a car one moment longer than is necessary to load or to unload it. Unfortunately the proportion of shippers who take this view of the situation, when they themselves are the detainers, is very small. Every shipper holds this view when it is some one else that is detaining the car. Car users who detain cars through carelessness, indifference, or ignorance of the meaning of "car shortage" and "congested terminals" are few. The people responsible for car detention are that vast body of highly intelligent business men who find it more profitable to use cars for storage purposes than to provide other storage facilities. Other reasons for car detention by this class of shippers are comparatively insignificant.

It is not good business to use for storage, space which costs 50 cents per cubic foot to construct, when better storage space can be had for one-third that cost or less, and especially when the higher priced space can earn so much more as a freight car than as mere storage. Storage space does not need costly trucks, steel underframes, automatic couplers, and air brake equipment. Shippers must realize that, from one point of view, they and not the railroads are the owners of the cars of the country. So long as they insist on using them as storage warehouses they must be prepared to pay the cost without complaint. Moral suasion has so far failed to induce them to construct their own storage warehouses when they could get apparently cheaper storage in freight cars. The next step in remedying car shortage should be to limit more closely the free time allowed and to impose demurrage charges sufficiently high to make storage in cars clearly unprofitable.

Refrigerator cars are now paying the nominal demurrage charge of $1 per day and, in some cases, additional charges for track storage. The proposal to impose higher and other charges, in addition to track storage and ordinary demurrage, as a penalty for the detention of refrigerator cars, is a move in the right direction. It will do more than anything else to solve the problem of shortage of refrigerator cars. It will also give an impetus to the erection by municipalities, railroad companies, and private capital of terminal markets with track connections and ample cold storage facilities. . . .

The railroads are between the upper and nether millstone of the man who has the car and the man who wants it. Each abuses the road for the shortcomings of the other. In the last analysis of the case both are the same man, unable or unwilling to see that a car can not be a stationary warehouse and a movable vehicle at the same time. The railroads would gladly forego all revenue from demurrage in return for prompt release of cars.

Some of the state demurrage codes contain provisions apparently designed as special concessions in favor of the farmer. No doubt other industries would not very readily give up any special concessions in their favor on the strength of the farmer voluntarily giving up his. It would seem, however, the proper thing for farmers to insist on the elimination from all demurrage regulations of all special concessions in their favor. Then they could with greater force demand the abolition of concessions in favor of others. This would mean a minimum of car detention, more cars for all shippers, and greater prosperity for the farmers.

The Kenitra-Mequinez Railway of Morocco.—The military railway between Kenitra and Mequinez has been completed to within 3½ miles of Fez, and will probably be opened for traffic in May. The use of the railway has been restricted hitherto by the insufficiency of the rolling stock and the difficulty of obtaining engines, etc., from France. The freight rates work out very favorably in comparison with transport by camel between Fez and Laraiche. While the journey will only take three days by this route, the journey by camel from Laraiche to Fez takes 12 days in summer and 50 days or more in winter. There seems little doubt that, if the deficiency in rolling stock can be made good, the Kenitra route will have a great advantage over that by Laraiche and the traffic of the latter port will be very seriously affected by the opening of this railway.

Tests of a Mountain Type Locomotive on the Rock Island

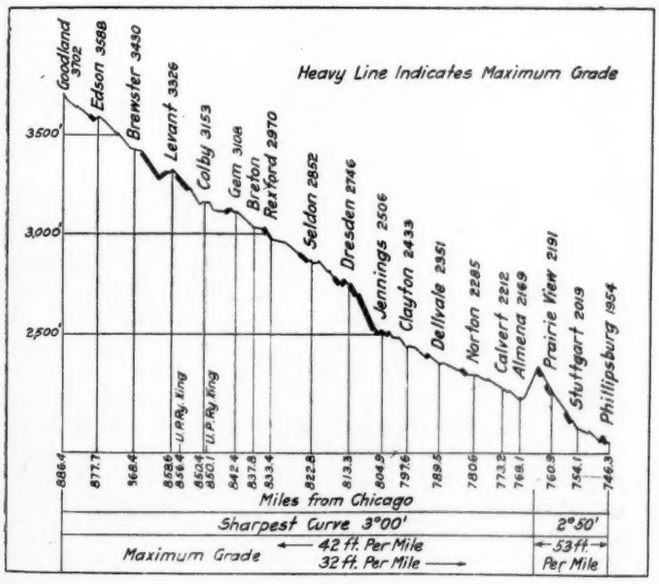
Conducted with 16-Car Trains on District with One Per Cent Grades; Maximum Horsepower Developed 2700

By W. J. Tollerton

General Mechanical Superintendent, Rock Island Lines, Chicago, Ill.

The Chicago, Rock Island & Pacific recently conducted some tests with one of their Mountain type locomotives, No. 999, which is one of two delivered to that road by the American Locomotive Company in the Fall of 1913. These locomotives were intended for hauling the St. Louis section and the Chicago section of the Colorado trains in one train west of Phillipsburg, Kan.

From Phillipsburg westward to Goodland, on the Colorado division, over which the tests were made, there is a steady uphill pull for 139.9 miles with maximum and ruling grades of 1.0 per cent, as shown on the accompanying profile. The trains on which this type of locomotive is used have a normal consist of 10 or 11 all-steel cars, the weight varying from 675 to 750 tons, and the locomotive is capable of hauling as high as 1,175 tons in 19 cars. In the distance of 139.9 miles there are 16 stations, 4 of which are regular stops and the remaining 12 are flag stops. On an average, 11 or 12 stops are made on this run, and it is not infrequent that 15 stops are made, resulting in hard pulls out of stations, many of which are located at the



Profile of the Colorado Division Between Phillipsburg and Goodland

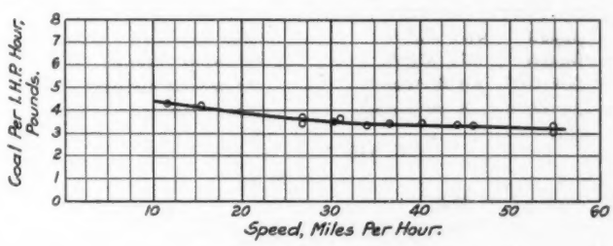
foot of grades. This is shown by reference to the profile. It will be seen, therefore, that a locomotive which can successfully and economically haul this train must have both a high starting tractive effort and a relatively high sustained tractive effort at high speeds.

The Mountain type locomotives were described in the *Railway Age Gazette* for January 9, 1914, on page 86. They weigh 224,100 lb. on drivers, and have a total weight of 333,100 lb., cylinders 28 in. by 28 in., 69-in. drivers, and a maximum tractive effort of 50,000 lb. In 14 of these tests the number of cars ranged from 10 to 16, with an average weight of 674 and 1,045 tons, respectively. In addition to these trips later tests were made with 19-car trains with a weight of 1,175 tons, exclusive of lading. The tests were made in regular service, the trains leaving Phillipsburg at 8:30 p. m. and arriving at Goodland at 12:45 a. m., giving a schedule running time of 4 hr. 15 min., and a schedule speed of 33 miles per hour. For the 10-car and 16-car tests the locomotive was equipped for taking indicator cards, determining temperatures in the steam chests and front end, steam pressures in the superheated and saturated steam chambers of the superheater header, and the draft, as well as for obtaining the steam consumption by the various auxiliaries. The tender tank and boiler were calibrated and the water was measured at all stops from the start of the test. The coal was delivered to the firemen in quantities of 100 lb., being loaded on the tender in bags for this purpose. The same engineer and firemen were used throughout the tests in order that the conditions would be as nearly as possible the same. A shield was built over the pilot for the protection of the observers, as shown in the illustration. This enclosure was lighted with electric lamps, the current being provided by the electric headlight generator.

The accompanying table gives the average results of three tests each, with an average of 10 cars and an average of 16 cars in both directions.

Test Results for the Mountain Type Locomotive

Items	Westbound		Eastbound	
	10 Cars	16 Cars	10 Cars	16 Cars
Mileage	139.9	139.9	139.9	139.9
Tonnage	674	1,045	709	1,028
Ton-miles	94,292	146,196	99,190	143,817
Time between terminals, hr. and min..	4—20	4—20	3—31	3—33
Time, running, hr. and min.	3—30	3—48	3—07	3—10
Average speed between terminals, m.p.h.	34.98	32.42	39.84	39.48
Average speed, running m.p.h.	40.06	36.89	44.79	44.13



Curve of Coal Consumption

Coal used between terminals, lb.	18,133	27,033	10,943	13,433
Coal per gross 1,000 ton-miles, lb.	193.72	184.84	110.52	93.33
Coal per car mile, lb.	12.57	11.83	7.59	6.00
Coal per i. hp. hr., lb.	2.58	3.17	.....	.....
Coal per sq. ft. grate area per hr. (between terminals), lb.	72.26	99.57	49.77	60.45
Coal used at terminals, lb.	2,902	3,500	3,010	3,517
Water delivered to boiler between terminals, lb.	119,170	155,446	75,609	93,076
Water per i. hp. hr., lb.	16.98	18.29	.....	.....
Steam used in cylinders (net), lb.	106,807	140,606	58,090	70,231
Steam used per hr. in cylinders (open throttle), lb.	33,707	40,514	20,382	26,582
Steam used per hr. in cylinders (running time), lb.	30,591	37,074	18,960	22,891
Water evaporated per sq. ft. evaporating surface per hr., lb. (throttle open)	9.13	10.86	.....	.....
Water evaporated per sq. ft. total heating surface per hr., lb. (throttle open)	7.43	8.85	.....	.....
Steam used per pound of coal, lb.	6.57	5.76	.....	.....
B. t. u. absorbed per pound of dry coal.	8,539	7,525	.....	.....
Efficiency of boiler (dry coal)	67.74	59.70	.....	.....
Steam pressure—				
Boiler, lb. per sq. in.	182.5	181.1	.....	.....
Saturated steam chamber in header, lb. per sq. in.	172.9*	178.8	.....	.....
Superheated steam chamber in header, lb. per sq. in.	157.7	160.4	.....	.....
Steam chest, lb. per sq. in.	154.1	158.6	.....	.....
Initial in cylinder, lb. per sq. in.	145.6	152.9	.....	.....
Temperature at steam chest, deg. F.	580.8	598.3	.....	.....
Superheat, deg. F.	212.9	228.2	.....	.....
Smokebox temperature, deg. F.	511.7	538.9	.....	.....

*This pressure is low due to throttling.

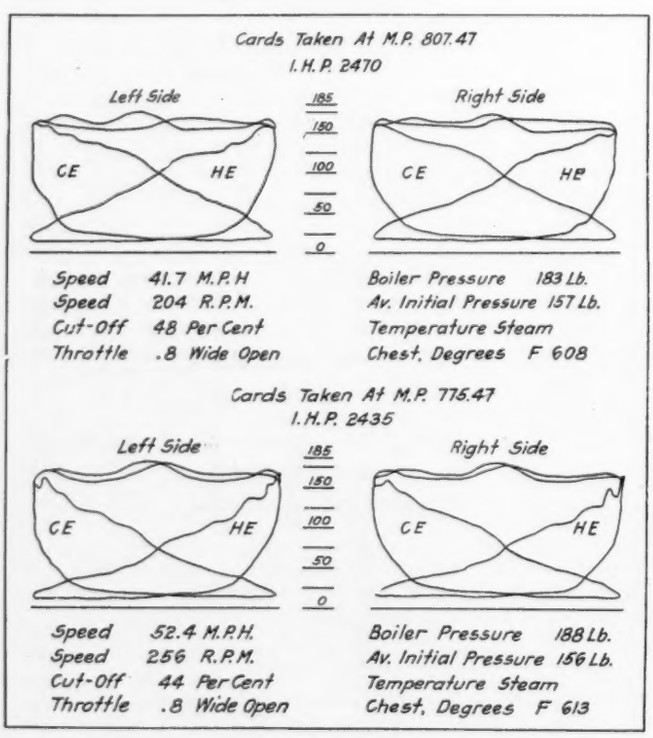
The power of the locomotive was not taken on the eastbound trips as the grade is mostly descending. This will account for the difference in the coal and water rates between the eastbound and westbound trips.

An inspection of these tabulated results shows that the loco-

motive operated more efficiently on the ton-mile basis with 16-car trains. In the tests with the 19-car trains, which were simply coal and water tests, this efficiency showed still greater increase, the average coal consumption per 1,000 gross ton-miles being approximately 138 lb. It will be noted that the coal consumption per indicated horsepower hour with the 16-car train was 3.17 lb. at the time maximum horsepower was developed. This is somewhat better than the theoretical rating applied to this locomotive, which is 3.25 lb. The water rate per indicated horsepower hour is also better than the theoretical rating, the tests showing it to be 18.29 in contrast to a theoretical rating of 21.6 lb. It was found that the maximum horsepower developed for short periods exceeded the theoretical rating, the former being 2,700 and the latter 2,613.

Another feature of the test which shows that the locomotive was not being worked to its full capacity with a 10-car train is the drop in pressure of approximately 10 lb. between the boiler and the saturated steam chamber in the superheater header. This drop is explained by the fact that it was necessary to throttle the locomotive to keep from exceeding the speed limit with this load. The results also show how the superheat increased as the locomotive became more heavily loaded.

The fuel used in these tests was good quality Colorado coal



Examples of Indicator Cards Taken on the Tests

of mine run consistency. The approximate analysis, as taken from several different cars, was as follows:

Moisture	1.69 per cent
Volatile matter	36.69 per cent
Fixed carbon	47.58 per cent
Ash	13.45 per cent
Sulphur	.59 per cent
Total	100.00 per cent

The heat value obtained by the calorimeter was 12,604 B. t. u. for dry coal, and 12,593 B. t. u. for wet coal.

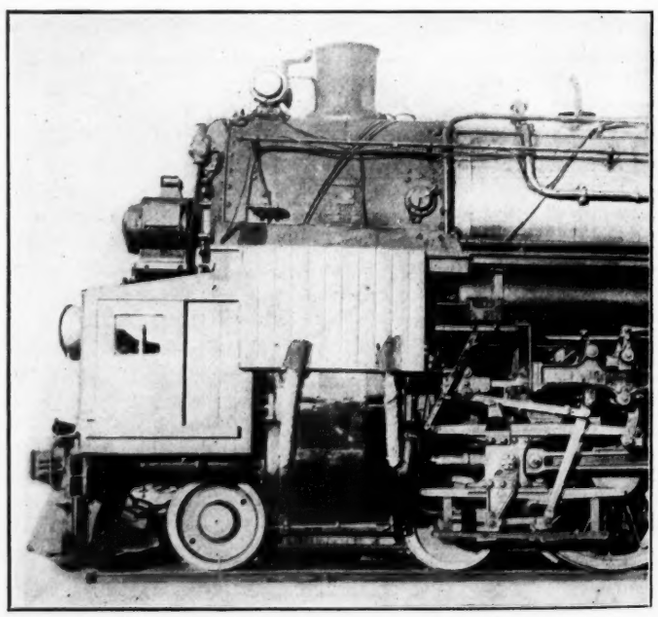
Exceptionally good performance with 19-car trains was shown on various occasions. On the ruling grade immediately out of Prairie View, going west, the locomotive, from a standing start at the foot of the one per cent grade, reached a speed of 23 miles per hour at a point 3.5 miles west. The locomotive was working at 50 per cent cut-off and carried full boiler pressure. With a 19-car train on the three-mile, 0.8 per cent ruling grade between Jennings and Dresden, the speed at the foot of the grade was 33 miles per hour and at the top 23 miles per hour, the locomotive working at 50 per cent cut-off and carrying full boiler pressure. These figures are not the result of one or two performances, but are quite representative of the performance of this locomotive.

With the 19-car train, no stop was made at the coal chute at Selden (a half-way station between Phillipsburg and Goodland), the locomotive arriving at Goodland with about three tons of coal on the tender. Under these unusual conditions, viz., maximum trains, running by coal chutes, etc., sacked coal was carried on the rear of the tank and an extra man was kept on the locomotive in case an emergency arose which would require using all the loose coal in the tank and some which was sacked.

The success attained by the engine crew in handling these large trains may be attributed partly to the efficiency of the crew, and partly to the design of the modern locomotive, including as it does such labor-saving devices as the superheater, brick arch, screw or power reverse gear, pneumatic fire door opener, and a tank with sloping coal sheets, so that 70 per cent of the coal is kept within reach of the fireman.

The following is a list of the general data for the locomotive used in the test:

Number	999
Type	4-8-2
Service	Passenger
Fuel	Bit. coal



Arrangement of the Indicator Reducing Motion and the Shield to Protect the Observers

Tractive effort	50,000 lb.
Weight, total	333,100 lb.
Weight on drivers	224,100 lb.
Weight on leading truck	57,500 lb.
Weight on trailing truck	51,500 lb.
Weight of engine and tender	490,500 lb.
Wheel base, driving	18 ft. 0 in.
Wheel base, total	38 ft. 11 in.
Wheel base, engine and tender	70 ft. 2¼ in.

Ratios

Weight on drivers ÷ tractive effort	4.48
Total weight ÷ tractive effort	6.66
Tractive effort × diam. drivers ÷ equivalent heating surface*	623.53
Equivalent heating surface* ÷ grate area	88.24
Firebox heating surface ÷ evaporative heating surface, per cent	7.58
Weight on drivers ÷ equivalent heating surface*	40.48
Total weight ÷ equivalent heating surface*	60.18
Volume both cylinders, cu. ft.	19.94
Equivalent heating surface* ÷ volume of cylinders	277.50
Grate area ÷ volume of cylinders	3.14

Cylinders

Kind	Simple
Diameter and stroke	28 in. by 28 in.

Valves

Kind	Piston
Gear	Baker

Wheels

Driving, diameter over tires	69 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	11 in. by 22 in.
Driving journals, others, diameter and length	11 in. by 13 in.
Engine truck wheels, diameter	34 in.
Engine truck journals	7 in. by 12 in.
Trailing truck wheels, diameter	42 in.
Trailing truck journals	9 in. by 14 in.
Tender wheels, diameter	33 in.
Tender journals	6 in. by 11 in.

Boiler

Style	Conical
Working pressure	185 lb. per sq. in.
Outside diameter of first ring	78 in.
Firebox, length and width	107 7/16 in. by 84 in.
Tubes, number and diameter	207—2¼ in.
Flues, number and diameter	36—5½ in.
Tubes and flues, length	22 ft. 0 in.
Heating surface, firebox	287 sq. ft.
Heating surface, tubes and flues	3,805 sq. ft.
Heating surface, arch tubes	25 sq. ft.
Heating surface, total	4,117 sq. ft.
Superheating surface	944 sq. ft.
Equivalent heating surface*	5,533 sq. ft.
Grate area	62.7 sq. ft.

Tender

Water capacity	8,500 gal.
Coal capacity	14 tons

*Equivalent heating surface = evaporative heating surface + 1.5 times the superheating surface.

REMOTE SWITCHES MOVED BY BATTERY CURRENT

On the Northern Pacific, at Bozeman Pass Tunnel, 12 miles west of Livingston, Mont., there are two switches at the entrances of two side tracks, which are worked by electric motors controlled by the telegraph operator at the mouth of the tunnel, nearly a mile away. The motors are the low-voltage switch machines of the General Railway Signal Company, and were put in last November. With these the stopping of freight trains on the steep ascending grades for the purpose of having the switch set for the side track by hand is no longer necessary. The movement of a switch takes 23 seconds. C. A. Christofferson, signal engineer of the road, gives the following particulars of this installation.

Each of the side tracks is 4,500 ft. long, one east of the tunnel and one west, and each is used, when necessary by freight trains ascending toward the tunnel, which is at the summit. As pushing engines are used on both sides of the tunnel the number of movements is comparatively large, and economy of time is an important desideratum. The line through the tunnel is single track and the staff system is used. At the entrance of each side track a two-arm signal was installed, and there is a short track circuit section at the switch to serve the purpose of a detector. The control circuits for the signals are selected by the switch so as never to give a wrong indication. There is also a special relay, normally de-energized, to provide against danger from crosses between wires. Repeaters in the telegraph office, one for each signal arm, keep the operator constantly posted as to the position of the signals.

Trains are announced by a bell which is rung when the engine passes a point two miles away; and on this announcement, having received suitable instructions from the train despatcher, the operator sets the switch for the siding.

The switch machine is provided with an emergency crank which can be used by trainmen in case of failure of the electric circuit. Suitable provision is made for guarding against the application of power by the crank and by the electric current at the same time.

The battery, which works the signal arms as well as the switch machine, consists of seven cells of 20-ampere-hour lead storage battery, charged by 24 cells of 400-ampere-hour caustic soda battery. The time required for a complete operation of the switch machine, the signal, and the repeater in the telegraph office, is 31 seconds. The maximum current required is 4½ amperes, which is required to lock the switch.

The whole system has worked thus far without failure, and, of course, it makes a decided saving in the movement of heavy freight trains on ascending grades when they are required to take the siding. The company intends to try a device for setting switches, in situations like this, without the intervention of the operator; that is to say, by means of a contact rail, fixed on the ties some distance back of the switch, with a sliding contact on the locomotive which, when adjusted by the engineman, will close an electric circuit which will operate the switch and the signal.

CHICAGO, ROCK ISLAND & PACIFIC STOCKHOLDERS' MEETING

At the annual meeting of the stockholders held in Chicago on April 12, Charles Hayden of Boston, William J. Matheson of New York, W. E. Roosevelt of New York and N. L. Amster of Boston were elected directors, succeeding E. S. Moore, J. J. Mitchell, D. G. Reid and Roberts Walker. The election came at the close of a stormy meeting which lasted from noon until nearly 10 o'clock at night, in which Amster and his lawyers attempted to oppose the actions of the majority, represented by the Sheldon proxy committee, at every move.

Counsel for the Amster committee had previously made a written agreement with counsel representing the majority stockholders, by which it was provided that if the meeting were held in accordance with certain mutually agreed on conditions, the by-laws would be abided by and that no opposition would be put in the way of the election of directors by the representatives of the minority stockholders. As soon as the meeting had been called to order, however, a motion was made to appoint tellers other that those appointed by the board of directors. Mr. Amster claimed that he did not know of the agreement previously made by his representative. The by-laws provide that the board of directors and not the stockholders shall appoint the tellers and that the board of directors shall amend the by-laws, but there is no provision by which the stockholders can amend the by-laws. Mr. Amster and other representatives of the minority stockholders proposed the amendment of the by-laws and the motion was ruled out of order by the chairman. A motion was then made to adjourn until May 24 and at that time elect 13 directors, but this motion was ruled as out of order because of carrying the rider in regard to the 13 directors.

Finally a straight motion to adjourn was made. This motion was put to a vote, each share of stock having one vote, and a recess was taken during the counting of the vote. It was during this recess that Mr. Van Hall made the statement which is commented on in the editorial columns of this issue. The count of the vote on the question of adjournment showed—437,197 votes against adjournment and 151,579 for adjournment.

Representatives of the minority stockholders thereupon entered á protest against this vote on the ground that there had been no time for the Amster committee to circularize stockholders for proxies; on the ground of the complaint filed in the courts on April 9 (the substance of this complaint is given below); that the Sheldon committee had offered to put 10-cent revenue stamps on voting certificates, which was an illegal inducement to secure proxies; and finally that the Sheldon proxy certificates had not been stamped.

The election of directors then took place and by the concentration of their votes on one director the minority interests elected Mr. Amster, and the three other directors previously mentioned were elected by the majority.

A resolution was then adopted providing for the appointment of a committee of five stockholders to draw up a new set of by-laws for the company. A vote was then taken on the motion of a stockholder, who said that he represented neither minority nor majority interests, ratifying the proceedings of the meeting. The minority representatives voted against ratifying the proceedings, the majority and the independent stockholders voting in the affirmative. The vote, therefore, was carried in about the proportion as that of the vote against adjournment.

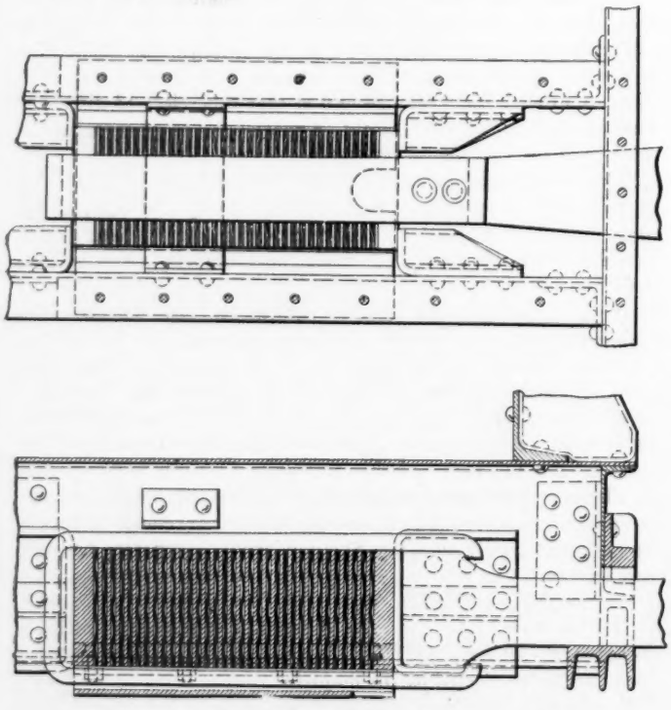
On April 9 counsel representing the minority interests filed a bill of complaint in the United States district court at Chicago

asking an injunction restraining the holding of the stockholders' meeting and the voting of the Sheldon committee proxies. The injunction was denied, although the bill of complaint is still before the court to be acted on. Summarized briefly the bill of complaint alleges (1) that the directors and officers unlawfully refused permission to stockholders to see the stockholders' list and at the same time gave the Sheldon committee, which represents the majority interests, the addresses of stockholders for the express purpose of permitting the Sheldon committee to circularize stockholders for proxies; (2) that the Sheldon committ secured proxies without revealing to the stockholders that they were used for the benefit of the present management; (3) that the division of the Chicago, Rock Island & Pacific board into three classes, with four directors each in two of the classes and five directors in the third class, is unlawful under Illinois statutes, which provide that directors should be divided into classes with three in each class; (4) that the present division of directors into classes deprives the minority stockholders of their rights under the Illinois constitution to the exercise of cumulative voting.

FRICTION SPRING DRAFT GEAR

The drawing below shows the plan and half-sectional elevation of the Slick friction spring draft rigging which was recently developed by the Carnegie Steel Company, Philadelphia, Pa.

The springs in this rigging are formed of comparatively thin, square or rectangular corrugated steel plates, the axes of the corrugations being parallel to each other. A number of these plates are used, the corrugations of each being placed at right angles to those of the two adjoining plates. The arched portions of the plates are thus in contact with each other, and each



Slick Friction Draft Gear

plate forms an abutment against which the adjoining plate operates. The device may be made either with single corrugated spring plates or where greater stiffness is desired the elements may be made up of two or more laminations each. The construction of the rigging is otherwise similar to that commonly used with other types of spring elements.

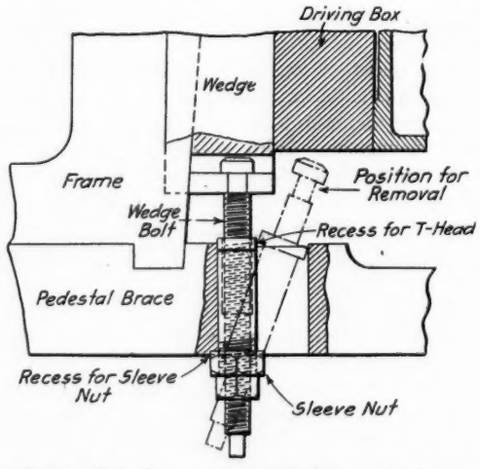
When under load the plates withstand stresses first by the spring action of the corrugated portions, which tend to flatten out under pressure, and in addition by the frictional resistance to the movement of the plates one upon another due to the flattening out of the corrugations. This action tends to dissipate a portion of the energy delivered to the draft rigging.

It is also claimed that the arch action of the corrugations tends to distribute the stress through the curved portion of each corrugation in such a way as to counteract to a certain extent the stress in the tension side of the plates. The depth of the corrugations is such that when each plate is flattened under load the stresses will be about equal to the proper working stress of the material.

LOCOMOTIVE WEDGE BOLT

A wedge bolt which may be applied and removed without taking down the pedestal binder is shown in the engraving. This device, which is manufactured by the Wine Railway Appliance Company, Toledo, Ohio, is made standard for all wedges on the locomotive, and in case of emergency may be renewed by the engineer while the engine is in service.

The pedetsal brace is provided with a slot, as shown in the drawing, through which is inserted a tee headed sleeve. The wedge bolt is screwed into this sleeve, which in its normal position becomes a rigid part of the brace, and the bolt is operated in the same manner as if the sleeve were not used. The top of



Wedge Bolt Removable with Binder in Place

the pedestal brace is provided with a recess for the reception of the tee head and the bottom of the brace is provided with a recess for the sleeve nut, which is threaded on the sleeve and holds it rigid within the pedestal brace.

It will be noted that the nut which locks the wedge bolt bears against the sleeve nut and acts as a lock nut for the sleeve as well.

To remove one of these bolts, all that is necessary is to back off the lock and sleeve nuts until the tee head on the sleeve can be lifted out of the recess in the top of the pedestal brace. The sleeve is then revolved through 90 deg. into the position shown by dotted lines, the head of the wedge bolt being slid out of the slot in the wedge at the same time. In order to do this the wedge must be drawn down into the position shown so that the slot in the wedge is clear beneath the driving box.

This device is in use on about 100 engines and is said to be giving excellent service.

PROJECTED RAILWAY FROM FIUME, HUNGARY, TO NOVI, CROATIA.—A concession has been granted for the construction of a 25-mile railroad from Fiume to Novi, Croatia, passing through the towns of Susak, Buccari, Portore, Cirquenizzo and Selce. The Fiume branch of the Hungarian bank secured the concession, which was asked for before the war began. Work will probably not begin until normal times return again.

Maintenance of Way Section

Start Your Work Early

No single practice is more conducive to economical maintenance of way work than starting operations early in the spring and taking full advantage of the seasons. With the present indications that continued retrenchment will be the order this year, it is all the more necessary that maximum results be secured from every dollar expended. Many roads have already entered actively upon their work and are now well advanced in their surfacing, tie renewals, etc. Those who are still holding back for the close of the fiscal year or other reasons should consider what this delay means in ultimate expenditure. Now is the time to start.

The Season of Tie Renewals

Approximately three per cent of all expenditures for maintenance of way and structures are for ties. With the exception of the roadway and track and the labor account, this is the largest single item in this group, being over three times that for rail. The importance of careful supervision in the renewal of ties to secure their full life, while at the same time maintaining the track in proper condition, is therefore evident. At this season of the year the track forces are very largely engaged in the renewal of ties. For this reason we devote a large amount of space in this issue to this and allied subjects.

Co-Ordination of Association Work

At the closing session of the convention of the American Railway Engineering Association last month a resolution was adopted requesting the Board of Direction to consider a plan by which the conclusions of certain other associations working along the same lines should receive the endorsement of this association without discussion in detail before its conventions. While this resolution is so general in its character that it might apply to any technical association, it undoubtedly refers more particularly to those in the maintenance of way field and is the first step towards the co-ordination of the work of these societies. The other important associations in this field include the Railway Signal Association, the American Railway Bridge & Building Association, the Roadmasters' & Maintenance of Way Association, the Maintenance of Way Master Painters' Association, and the American Wood Preservers' Association, the latter association having among its members commercial as well as railway men. Each of these societies specializes in work covered in a general way by the American Railway Engineering Association. Up to the present time the only one of them whose work has been co-ordinated with that of the Engineering Association is the Railway Signal Association. As a result there has been more or less duplication of work and even direct conflict in recommendations. It is evident that such a condition results in a loss in efficiency and a possible confusion in standard practices. It is the experience of each one of these associations that many more subjects are presented to it for consideration each year than it is possible to study properly. There is, therefore, sufficient work for all to perform without this unnecessary duplication. It would not seem especially difficult to co-ordinate the work of these various associations to remove these conditions. The American Railway Engineering Association and the Railway Signal Association are now working in close co-operation and the reports presented to the two associations harmonize. A similar arrangement is gradually being perfected between the American Railway Engineering Association and the American Wood Preservers' Association. A somewhat different arrangement would be necessary with reference to the other associations because of the greater variety of the subjects within the scope of their investigations. It would seem practicable for an advisory committee composed of two or three officers of each association to consider the suggested lines of work for the different associations and to so harmonize them as to remove the present objections. This committee need not have any direct authority over the different associations, but could act in an advisory capacity only. In this way each of the associations would maintain its complete identity and independence while at the same time it would be informed regarding the contemplated work of other associations. There is a definite need for complete harmony in the recommendations of different associations on the same subject as well as for so planning the investigations that the greatest amount of information may be brought out. We believe the time is now ripe for the inauguration of some such plan as outlined.

Contest on Bridge Construction Methods

Fourteen papers were received in the contest on Bridge Construction Methods, which closed March 10. These papers were referred to W. H. Finley, chief engineer, Chicago & North Western, and C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul, who awarded the first prize to I. L. Simmons, bridge engineer, Chicago, Rock Island & Pacific, Chicago, and the second prize to James H. Stack, secretary, The Thomson Bridge Company, San Francisco, Cal. Other papers were presented by: E. K. Barrett, supervisor of bridges and buildings and water service, Florida East Coast, St. Augustine, Fla.; C. M. McVay, engineer maintenance of way, Kanawha & Michigan, Charleston, W. Va.; E. M. Grime, supervisor, Northern Pacific, Dilworth, Minn.; J. B. Sheldon, supervisor bridges and buildings, New York, New Haven & Hartford, Providence, R. I.; J. J. Wishart, supervisor bridges and buildings, New York, New Haven & Hartford, Hartford, Conn.; L. C. Lawton, division engineer, Atchison, Topeka & Santa Fe, Newton, Kan.; J. E. Bebb, office engineer, Duluth, South Shore & Atlantic, Duluth, Minn.; S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md.; C. V. Chamberlin, assistant supervisor of bridges, New York Central, Utica, N. Y.; W. L. Ratliff, supervisor bridges and buildings, Illinois Central, McComb, Miss., and E. W. Fair, supervisor bridges and buildings, Buffalo, Rochester & Pittsburgh, Du Bois, Pa. The prize-winning and others of these papers will be presented in the May maintenance of way section.

SCREW SPIKES

IN spite of the fact that screw spikes are in service today on about 1,500 miles of main track, their use is still in its infancy. The first installation of any magnitude was one of a half mile on the Santa Fe near Topeka, Kan., in 1908. Since that time the mileage has risen to the figure given above and is increasing over 200 miles annually. The Santa Fe has over 150 miles of screw spike track and is now placing them in eight ties per rail on the western lines when laying new 90-lb. rail to secure a more rigid track construction. The Lackawanna is the largest user of screw spikes, having employed them exclusively in main tracks for both renewal and construction work for the past four years, until it now has over 12,000,000 in service. This line is one of relatively heavy grades and curvature with an average density of traffic of about 4,000,000 ton miles and 600,000 passenger miles per mile of line for the system, which figures are trebled if the main line only is con-

sidered, so that the service is unusually severe. For this reason the article by Mr. Ray describing the results secured from the use of screw spikes on the Lackawanna, which appears in another column, is of special interest.

Wherever introduced, the screw spike has encountered the opposition of the track men, who have pointed out numerous objections. The one most emphasized has been the difficulty of removing the spikes when necessary to replace rails following derailments or during relaying operations. The Lackawanna has a dense freight traffic on heavy grades, and therefore has its share of derailments. Therefore the conclusion of Mr. Ray that screw spikes have not been a disadvantage, but rather a decided advantage at such times, indicates that this fear has been exaggerated. It has been the experience of this road that by providing a stronger track the screw spikes have materially decreased its destruction as well as the delay to traffic while it was being repaired. Another threatened disadvantage that has not been encountered in the experience of the Lackawanna is difficulty in keeping the screw spikes tight. To offset these real or fancied disadvantages, screw spike track construction gives a stronger track, requires less maintenance after installation and greatly retards the destruction of the ties.

To secure the greatest advantages from the use of screw spikes in the conservation of ties corresponding standards must be adopted throughout the track construction. It is obvious that it is not economical to use screw spikes with untreated soft wood ties or without adequate tie plates. While not so obvious at first glance, it is also important that the ties be properly adzed and bored before treatment to retard destruction uniformly. It is interesting to note in this connection that the use of screw spikes has enabled the Lackawanna to secure sufficient resistance against track spreading by using a flat bottom tie plate and thus decreasing the abrasion of the tie.

Undoubtedly important modifications will be made in the use of screw spikes as their use is extended. At the same time the results obtained on the Lackawanna, the Santa Fe, the New Haven and other roads would indicate that they have proved their practicability. In general the relative economy depends upon the amount of money spent for maintenance. Where traffic is heavy and the expenditures for maintenance are correspondingly high, the savings resulting from the adoption of a more permanent form of track construction are of course greater than on lines of lighter traffic where a relatively long life is secured from the track materials. On the other hand, the Santa Fe is using screw spikes on its western lines where the rainfall is small and the resistance of timber to decay is relatively great, and where the ties customarily fail from mechanical wear. The subject is one of primary interest to all track men interested in ultimate economy in maintenance of way expenditures and in the strength of the track structure.

ORGANIZATION IN THE MAINTENANCE OF WAY DEPARTMENT

AT no time in our history has the subject of the organization of maintenance of way forces received more attention than at present. Much progress has been made in industrial establishments along certain lines following the reorganization of forces, as a result of which efficiency experts have urged their claims most vigorously on railway managements during the past few years. This has led to a greater interest in this subject on the part of railway men. As an example, one of the subjects assigned to the committee on Rules and Organization of the American Railway Engineering Association last year was a study of the science of organization, while other committees of this same association have been studying the economics of maintenance of way labor, leading largely to the same end, for three years.

The organization and methods of work of maintenance of way forces have changed to a surprisingly small degree during the past half century, expanding as the duties have increased but maintaining the same general character. This would tend to prove that the existing organization is the most efficient and places the burden of proof on the critics. However, up to the present time the railway managements have been forced to direct their energies primarily toward the development of facilities and methods of operation to handle the rapidly increasing business and many secondary practices have become standard without receiving a great deal of attention. With the more recent demands for economical operation has come the necessity for more efficient methods in all departments.

Numerous channels for investigation and experiment along this line have presented themselves. The bonus system which has been applied successfully in many commercial establishments and some railway shops has been attractive to some and has been tried on at least two roads to a limited degree. Other roads are reorganizing their forces on a permanent basis, giving their men employment throughout the year and rearranging their schedules of work with excellent results. Still other roads are investigating the possibilities of combining the various semi-independent groups of maintenance of way employees into one roadway organization and concentrating all ordinary maintenance of way work on a certain territory under this one force. Still other roads are devoting a great deal of attention to the installation of mechanical devices for many of the routine as well as the special problems usually performed by hand. While none of these plans has been developed sufficiently to enable one to say that it is entirely successful, they all have certain qualities which appear valuable when revised to adapt them fully to practical conditions.

It is the history of all important improvements that a certain amount of pioneering work must be done in opposition to general opinion. Many railway men believe that these various methods offered to increase the efficiency of maintenance of way forces are theoretical and that while present practices are not entirely satisfactory they are accomplishing as much as can reasonably be expected. The same opposition was shown a few years ago to the idea of the economy of heavy tonnage trains, to the creation of a favorable public sentiment towards the railways, and to the use of large locomotives, all of which goes to prove that the science of railroading is continually developing and that those who stand still are soon left behind. There is no reason to believe that the maintenance of way department differs from other railway departments, and while it is too early to determine just what results will be secured from these various experiments, they are entitled to sympathetic support in the hope that they may lead to ultimate success and economy.

NEW BOOKS

Masonry. By Malverd A. Howe, professor of civil engineering, Rose Polytechnic Institute. Size 6 in. by 9 in., 260 pages, illustrated, bound in cloth. Published by John Wiley & Sons, Inc., New York City. Price $2.

This book is entitled "A Short Text-Book on Masonry Construction, Including Descriptions of the Materials Used, Their Preparation and Arrangement in Structures." It is divided into three parts—Materials, Masonry and Specifications. The first part takes up natural building stones, their classification, tests, properties and methods of quarrying; also artificial building materials, including brick, terra cotta and plaster blocks, cement, sand, gravel and mortar. Part II takes up stone masonry, including ashlar, square-stone, stopewall, riprap and stone paving, brick and hollow tile masonry and concrete masonry, including the proportioning, mixing and depositing of concrete, surface finishing, waterproofing, etc. Part III contains the definitions and specifications for stone masonry, plain concrete, building brick, lime, sand and cement, adopted by the American Railway Engineering Association and a list of references to periodicals and books in which a more extensive discussion of the subject can be obtained.

Letters to the Editor

A GENERAL STORES DEPARTMENT

San Antonio, Tex.

To the Editor of the Railway Age Gazette:

In reading the article "Handling of Maintenance Material by the Maintenance Department," in the issue of February 19, it strikes me that Mr. Bowser has overlooked the very important feature that in the application of any principle the benefit to be derived by the property as a whole from the results thereof must be the governing factor, and has viewed his subject from the standpoint of mere convenience to those immediately supervising track, few of whom are yet of the belief that it is economy to have a superabundance of everything to avoid the absence of anything. It is my thought that 90 per cent of the maintenance of way officers of today would not favor the separate maintenance department store as outlined, and I doubt if 10 per cent of the general maintenance officers, who are responsible for final results, would approve such a plan.

Certainly there was need for the "general stores" system where it originated or the plan would not have been inaugurated, and it must have proven a decided betterment over previous practices on many roads, or it would not have been continued and broadened, nor would it have received so much favorable comment and apparently succeeded so well in many cases, as Mr. Bowser states. If this idea is correct, then why not allow the transportation, mechanical, signal and electrical branches of the service each to carry its own stores? Would he suggest five separate store organizations, each with its storekeeper for one or two divisions trying to order, receive, handle, distribute and account for its necessities separately and endeavoring to gather up and dispose of its scrap, usable second hand, and repairable material, similarly, as he has arranged for the maintenance department?

The "general store" system is not theoretical. Net results and consequent general adoption have proven it decidedly practical. Let one present the "each department order, handle, dispose of and account for its own material" plan to any management that has watched the results of a tried "general store" plan, and he can readily learn which is the theoretical and which the practical as viewed from the managerial platform. Did our experiences under the plan of "each user look out for himself and men," show that there was any effort to prevent getting heavy surpluses, any action toward getting rid of them when they did accumulate, or even that the material actually needed was not missing just as often, or possibly oftener, than under even an *ordinarily* supervised general store plan?

Can we find a general storekeeper, or say division storekeeper (the latter is the man closest to the division maintenance organization), "who probably possesses little or no intimate knowledge of the needs of the maintenance department?" If so, is he a real storekeeper? Generally he possesses an equal, and in some cases even a more correct knowledge than the user, of the quantity the latter will require in any given period. Why, "with the comparatively small territory supplied from his storeroom," should the division storekeeper serving all departments as a whole through the general stores system, not be able to keep in close touch with the needs for all work on his district?

After considerable study of this subject it is my thought that an up-to-date general stores system, with "live-wire" storekeepers, such as Mr. Bowser would have on the maintenance job, on proper divisions or districts, and departmental hedges all grubbed up and burned, or with these "store department Indians" camping on the "operating reservation," as Major Hine would have it, is one of the best railroad assets of the day from the stockholders' point of view.

H. C. Stevens,
Transportation Dept., San Antonio & Aransas Pass.

HOW THE N. R. A. EXHIBIT APPEARED TO A BRANCH LINE SECTION FOREMAN

Canadian Division, Section No. 10

To the Editor of the Railway Age Gazette:

Since seein' you at the show, thought p'raps you'd like to know, that I'd got back to No. 10, glad to be on job again. With my trip am very pleas'd. Good of the boss to send me. He paid expenses to and fro. Sure I'll be teachin' what I know and so perhaps efishency will bring a good return by me. Already I have had some talk with Vinelli, who is next my walk. He's a dago, inquisitive gape, but keeps his track in fair good shape, altho' old fashion, out-o-date. He's never made a trip, you see, after more efishency. Says he to me, "You comma back. I s'pose you see lotta 'bout track." "Oh, yes," I burst. Then he, quite sly, say "P'raps you learna tampa da tie." At which I, bulging with the know, say "It's a ceench, an easy go, the way they done it at the show." "How did they do it?" asks Vinell. "By wind." I then explain, and tell the hose and all. Vinell insist, that may be good but no use here, cause car is not equip for air. By gee, I'll surely have to see the man they call the M. C. B. And then he take a laugh at me. Next 'bout tie plates he want to know, which kind they like, at which I so, "While many plates good in their way, for modern track cut little hay." "Why no? What then?" he doth exclaim. "Steel and concrete ties the game." "On long muskeg," Vinell replies, "much too heavy. Cedar ties, a top of sawdust, much the best, lightly on the top to rest." "Are so," say I and know him right. (Permanent track fades out o' sight.) "What else you see at greata show?" "A weeder," I inform. "No hoe is now required. A sprinkler is the modern way." "How much she cost?" return Vinell. And I admit I cannot tell. But track do look so fine. I'll ask the boss for some for mine. "Had you enough of oil, or short were you last month?" is his retort. I have to 'low that for my car I had to borrow from afar. "To get your weeder is no show," says Vinelli, and he know. "Some crossings stunts I s'pose were shown." A flange guard seen, I then make known, and various bells and warnin' signs, and swingin' stops which engines winds, by weight they said. At which Vinelli smile and said, "Now what in h——l is any use for such round here? Have you a crossing on your beat?" "Have you one either?" I repeat. I tell him it's good to know these things ahead a little so when at last they really come we won't appear like country bum. I see some track jacks work so ease. Their wound up when you buy and these just keep on jacking up and down, and when you want the track to lift, under the rail you make a rift, put in the jack and up she goes. Electric current is the force. "Just tap the power line, of course," adds that Vinell.

"Fence posts we see, in tin and stone, no forest fire will ever burn." "What's that to you?" he say. "Goldurn, we ain't got fence on our secs." I know that well but still me vex. "You should a seen ottomatick signals block, and flashing lights for interlock, and frogs and crossings Maganeese." Here friend Vinelli interject, "Have you got switch light on your sec?"

From all of this you'll see I think, Vinell's a knocker, and by jink, quite like the speaker who consined nothing good to the human mind. Whereas with Foster I agree one must the future try to see and smile and smile for seven miles, Mulholland said. I spose he meant full length of section—his intent.

Now good night. Wife and I start on the task to keep time the way committee ask. This letter will I'm sure reveal the good of a trip like mine. I feel so much improved and ready now to keep my sec. in year two thou., by then at least I feel that we will want those things I saw, by gee. And, Meester, thank you for your say, I again attend A. R. E. A. Exhib. of track is just a play to shimming, shimming, all the day. Here's hoping you will get these lines.

Yours very truly,

M. J. Hines.

P. S.—Spoke to boss again today bout motor car for my sec. Will not tell you what he say. M. J. H.

Renewing Heavy Swing Span by Floating Into Place

Old North Western Bridge in Milwaukee Removed and New Span Weighing 800 Tons Placed in One Day

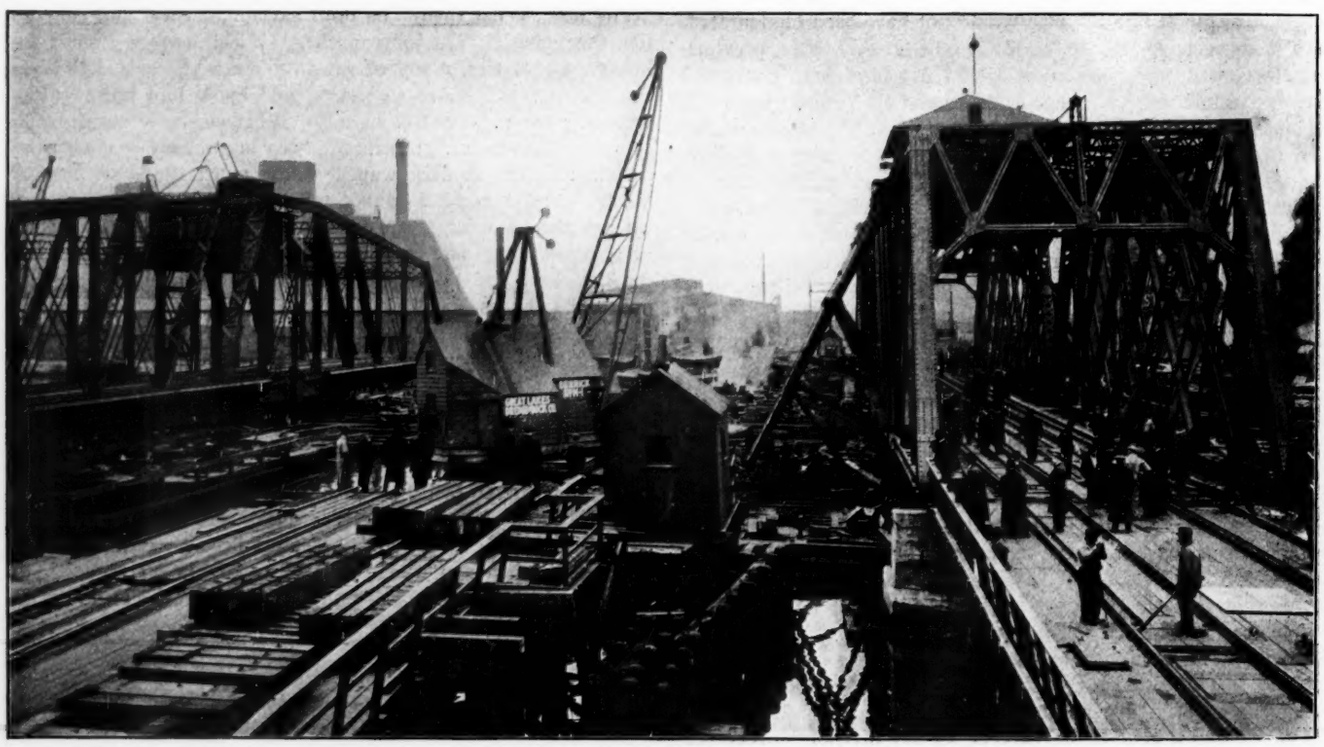
The placing in service of the new Chicago & North Western swing bridge over the Milwaukee river, in Milwaukee, Wis., on March 14, involved the simultaneous handling of two heavy spans on scows. The large amount of floating equipment necessary for such an undertaking and the care with which all details had to be worked out to safeguard the structures during the movement are noteworthy features.

This bridge is located about ¾ mile south of the Milwaukee passenger station on the main line to Chicago and about ¼ mile from the mouth of the river. It is a double-track structure, carrying all main line passenger trains and numerous freight and switching movements to and from the Milwaukee freight houses, the engine terminal just north of the river and the adjacent industries. Through freight trains use the belt line around the city.

The old bridge built in 1890 and operated by a gasolene engine was too light to carry the increasing wheel loads of modern equipment and the substructure also was in need of repair. Since another swing bridge could be built without the necessity for securing a new permit from the government, and the city and government officials were inclined to favor that type, it was decided to replace the old span by a new one of the same length, 240 ft., providing two clear channels of 90 ft. each.

It was essential on account of yard connections and the proximity of structures on the water front that the old alinement be retained on the new bridge, but in order to rebuild the center pier and the abutment it was necessary to remove the old bridge. It was, therefore, floated downstream about 60 ft. to a temporary location and traffic carried over it during the repair of the permanent substructure and the erection of the new bridge. The narrow right of way and the presence of elevators and docks close to the line limited the amount of this move so closely that the new bridge could not be erected in the open position on its permanent center pier. Falsework was therefore driven in line with the center protection pier upstream from the site to support the new bridge during erection.

The operation of placing this structure in position on the new substructure, without undue delay to traffic, required the movement of both bridges in one day. First the new span was blocked up on scows and floated out into the north channel, taken upstream to clear the falsework, then turned and brought down over the falsework to the permanent location. This movement could not be completed with the old span still in its temporary location on account of the difficulty that would then have been connected with the removal of the old bridge. So the new span was anchored about 100 ft. from the permanent location, while the old span was blocked up on scows and moved downstream a sufficient distance to clear the operations at the permanent location, after which the new bridge was brought down and centered on the permanent pier.



New Bridge in Final Location Before Scows Were Removed; Old Bridge Shown at Left Has Been Moved Downstream from Its Temporary Location

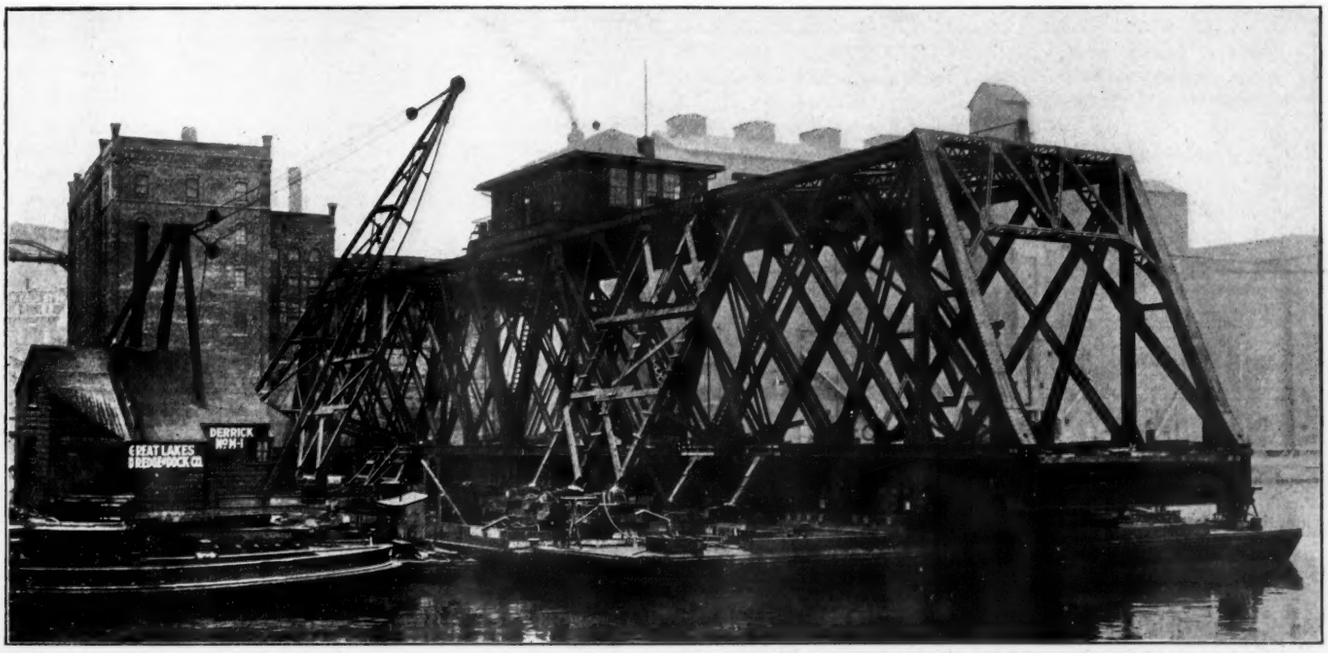
The moving of the old bridge to its temporary location on October 25, 1914, and of the new bridge to its permanent position, as mentioned above, were both carried out on Sunday, when river traffic could be stopped and the tracks cut between 10:15 a. m. and 4:00 p. m., during which time passenger trains were detoured around the belt line. In connection with the new work, a 56-lever General Railway Signal Company's all-electric interlocking plant was installed in a new tower, just north of the bridge, to govern movements across the river.

The first step in the renewal of the old bridge was the driving of piles for the temporary center piers, abutments and approaches on the downstream side of the bridge in its original location. At the same time, timber wedging and bracing was provided along the I-bar diagonal members in the two spans each side

of the center in each truss, to allow them to take the compressive stresses, which would result in carrying the bridge on scows located in the two channels. The movement of this bridge was successfully made on a steel scow 100 ft. by 35 ft. by 8 ft., and a wooden scow 112 ft. by 33 ft. by 9 ft. The bridge weighed about 500 tons, making it necessary to place the blocking against the stringers in order to secure the 2 ft. greater height for distribution of the load on the scows and to reinforce the bottom chords of the trusses in the wooden scow.

The old substructure consisted of stone masonry on timber piles. In the reconstruction, new concrete bridge seats and backwalls were placed on the abutments and a new octagonal concrete top on the center pier, after removing the old masonry down to a level as near the water as possible. The new pier top has a diameter of 34 ft. and is reinforced by ¾-in. radial bars 6 ft. long and five ¾-in. bars 14 ft. long, placed parallel to four of the faces.

The new bridge is 237 ft. 6 in. long, center to center of bearings, 31 ft. wide between centers of trusses, and 32 ft. high between centers of chords. The trusses are of the quadruple intersection type, with a panel length of 14 ft. 9 in. The structure was designed for a live loading of Cooper's E-55, with the following impact allowances: With the bridge closed, $I = \frac{3}{4}\,L + \frac{L}{L+D}$ for the trusses and floor beams, and $I = L + \frac{L}{L+D}$ for the stringers; for the bridge swinging I = 0.25 D. The bridge is of the combination center and rim bearing type, the load being equally divided between the 2 ft. 6 in. phosphor bronze and steel center castings and the 64 rim bearing wheels. The estimated weight of the bridge, with the operating machinery, was about 800 tons.



Floating the Milwaukee River Bridge on Four Scows Showing Diagonal Bracing for Distributing Loads on Two Main Scows

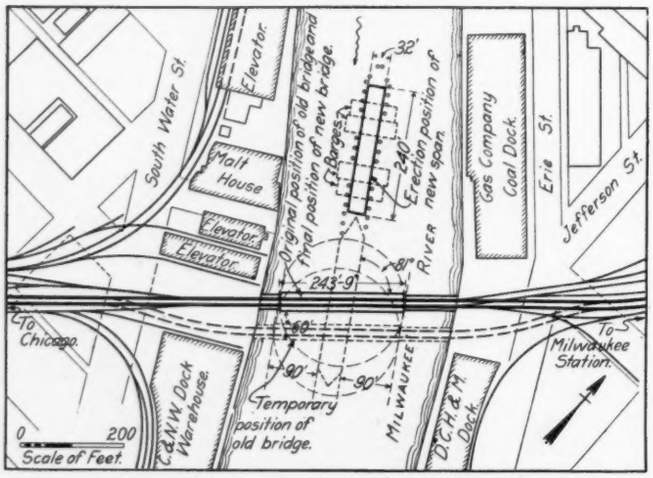
The bridge will be operated normally by electricity. Two independent sets of machinery for turning have been installed, each driven by a 75-hp. motor, which can operate the bridge in the necessary time. In addition to this, an emergency plant is provided at the operating house, consisting of a 32-hp. Fairbanks-Morse gasolene engine, operating at 200 r. p. m., which can be connected to the operating shaft in case of failure of the electric power. This power is purchased from the local public service company and is brought to the operating house through a submarine cable and a drag cable on the center pier. A 15-hp. motor at each end of the bridge operates the end latch, end lift and rail lift at that end, both of these motors being operated through one controller in the machinery house on top of the bridge. Three sets of lights above the controllers indicate to the operator when the movements of the rail lift, the end latch and the end lift, respectively, have been completed. The machinery is interlocked from the signal tower and the separate circuits in the operating house are also interlocked.

The erection car was placed on the new falsework from the end of the old span in the open position by blocking up that span and extending the rails on blocking, and all steel was delivered to the site on scows without interruption to river traffic. Two girder spans were provided in the falsework to allow the placing of the barges on which the bridge was to be moved into position. The operating rack, tread rim bearing wheels and spider and the lower two center bearing castings were located on the new pier. To assist in centering the bridge on the bearings a 10-in. steel band made in three pieces bolted together was placed around the center on the pier. Two short sections of the operating rack at diametrically opposed points on the circle were omitted before the new bridge was put in place in order to allow the pinions on the bridge to be lowered into position without damage to either the rack or the pinion. The bridge was later turned by tugs to mesh the rack and pinion, after which the short sections were put in place to complete the circle. In order to provide for any difference in the deflection at the ends of the bridge from that computed in advance, the end bearings were set one inch below the calculated elevation and two ½-in. and several thinner shims were provided to adjust this height properly.

All preparations for the placing of the new bridge had been completed before February 21, and an unsuccessful attempt was made to carry out the work that day. The weather conditions and the surge in the river caused by winds from the lake prevented the movement of the span on the two succeeding Sundays, but on the next Sunday, March 14, the conditions were favorable and the movements were made with complete success. To make sure that enough time would be available on Sunday for the movements of both bridges, the water-filled scows were placed under the new bridge and the blocking wedged up by the Saturday night preceding the day of the movement. These scows were watched during the night by crews and tugs to protect the outfit from damage by passing boats and also to be ready to remove the wedges immediately

if any considerable change of river level occurred due to a shifting of the wind.

Four scows were used under this span instead of two, as originally planned, enough of the falsework being removed to provide clearance for the additional scows outside of the other two. The new bridge with all of the blocking on the scows made a total load of nearly 1,000 tons. The plan provided for carrying this load on a steel scow 35 ft. by 100 ft. by 8 ft., and a wooden scow 33 ft. by 110 ft. by 9 ft. These two scows had ample capacity to support this load but in order to distribute it more evenly over their length, and also to support the bridge more rigidly against tipping, diagonal bracing from the top and bottom chords to the scow decks was placed as shown in one of the illustrations. This bracing was designed to carry 60 per cent of the load of the bridge, the remaining 40 per cent being transmitted to the blocking from the floor beams directly over the scows. Two feet of combing was provided on the steel scow and one foot on the wooden scow as a precaution against filling with water on account of listing or washing. The two additional scows were used to give greater stability to the span during the movement and also to assist in supporting the load during the lowering of the bridge on its new center pier. When nearly submerged a steel scow



Location Plan of Milwaukee River Swing Bridge on the Chicago & North Western Showing Permanent and Temporary Locations and the Erection Position of the New Span

is not thoroughly reliable and for this reason it was considered advisable to have the additional scows in position to help support the load at this critical point. These two scows were 90 ft. by 24 ft. and 98 ft. by 24 ft., respectively. They were blocked up under the floor beams but carried no diagonal bracing.

As Saturday night passed without a change in weather conditions the pumping out of the scows to raise the bridge was started by 6:30 a. m., river traffic having been stopped at 6 a. m. Eight pumps were used in unwatering the scows, with leads of steam hose from tugs, etc. The new bridge had been erected 1.5 ft. above its permanent elevation and was lifted about 17 in. off the falsework by the scows. This lift was completed by 7:30, and during the following hour the bridge was shifted sideways into the north channel, taken upstream far enough to turn it across the channel and brought down over the falsework, the caps and blocking of which had been removed in the meantime to allow ample clearance for the operating pinions. These movements of the structure on the scows were accomplished by hand operated lines, the tugs and other floating equipment standing by in case of need. On the downstream movement the current was more than sufficient to move the scows, making it necessary to hold back continually on the lines. The floating outfit was tied up within 100 ft. of the permanent location of the bridge and men left to watch the scows while the movement of the old bridge was effected.

By 10:00 a. m. the old bridge had been wedged against the blocking on four water-filled scows, two in each draw. These scows were from 75 to 80 ft. long and 24 to 28 ft. wide, lashed together in pairs with continuous blocking over the two. The last train passed over the old bridge at 10:15, and immediately afterward the eight pumps were started pumping out the water. By 11:15 the old bridge, with the rack, tread, etc., had been lifted about 16 in. off its pier and removed downstream out of the way, where it was tied up during the remaining operations on the new span.

The final movement of the new span was begun about 11:25, the scows being kept parallel to the protection pier until the northeast corner of the span was about one foot from the west end of the north pier. It was then held stationary while the south end was swung downstream to bring the bridge parallel to its final position. Keeping this relative position, it was then floated over the center pier and held as nearly as possible in the true alinement. The centering ring on the center casting was adjusted so that its diameter was about 3 in. greater than the diameter of the casting on the bridge, and as soon as this casting had entered the ring three men were stationed at the joints to tighten up the bolts, thus accurately centering the bridge. This adjustment was made with the span about 6 in. above its final position. When the adjustment was correct the span was lowered to a bearing and the wedges on the scows were at once knocked out, releasing the scows soon after. Before 4 o'clock the track connections at the ends of the bridge had been completed, the end bearings adjusted and the power cable connected so that the first train was passed over the new bridge without delay. After this train had passed the bridge, the span was swung to mesh the pinions and the operating rack, the power was tested and the bridge operated at 5:20, allowing river traffic to be resumed according to schedule at 6:00 p. m.

During the centering of the new span the old bridge was floated downstream and was held on the scows for several days until a favorable opportunity offered for landing it endwise onto a dock. This landing was accomplished by sliding it on the floor beams on lines of rails placed on blocking at the proper height. The scows were removed one at a time and additional supports provided as necessary to carry the proportion of the weight of the bridge still over the water.

The design of the new bridge and the method of renewal were worked out under the direction of W. H. Finley, chief engineer, and W. C. Armstrong, formerly bridge engineer. H. M. Spahr was the resident engineer in charge of railway company's work in field. The substructure was built under contract by the Cleary-White Construction Company, Chicago, the superstructure was fabricated by the American Bridge Company and erected by the Bernhisel Construction Company, Chicago. The power equipment was installed by George P. Nichols & Brother, Chicago, and the Great Lakes Dredge & Dock Company handled the movements of the spans.

WAR TRAFFIC ON THE METROPOLITAN RAILWAY OF ENGLAND.—Since August the Metropolitan Railway, which connects with the Midland and Great Northern systems in the north of London and with the South-Eastern & Chatham, and London, Brighton & South Coast systems in the south, has been the means by reason of its lines under the "Circle," near Farringdon street, of conveying over these lines no fewer than 2,738 troop trains. During the despatch of the expeditionary force as many as 58 troop trains a day passed over the Metropolitan lines without any sensible interference with the ordinary passenger traffic. In addition to this burden during the first fortnight of February, 2,935 freight trains, equal to 210 a day, have passed over the Metropolitan lines, in addition to special trains with troops and government stores and the ordinary local passenger service throughout the day. This has been carried out without interference with normal traffic, except on one or two days of exceptional pressure, and without mishap of any kind.

Results of Five Years Extensive Use of Screw Spikes*

Lackawanna Has Over 12,250,000 Screw Spikes in Track, Giving Satisfactory Service Under Heavy Traffic

By G. J. Ray
Chief Engineer, Delaware, Lackawanna & Western

The general use of screw spikes in new construction and in maintenance on the Lackawanna was started early in 1910, and during the past five seasons 5,120,000 flat-bottom tie plates and approximately 12,272,000 screw spikes have been placed in new and old tracks. As would be expected, some mistakes were made at first, and no doubt later developments will change present practice somewhat. As a whole, however, the screw spike installation has proven very satisfactory, and no conditions have developed to cause any doubt of the ultimate success of the undertaking. Many minor difficulties which we had anticipated have not developed. It was fully expected that no small amount of trouble would be experienced from derailments, changing out broken rails, difficulty in gaging track on sharp curves, etc. It is a pleasure to state that, to the writer's knowledge, we have never had a derailment where the screw spikes have not been very much less damaged than the cut spikes in the same locality, and very seldom has a derailment broken off any screw spikes or damaged them to such an extent that they did not continue to hold the rail firmly in place. We have had many cases of derailments where it was not necessary to remove a screw spike, whereas nearly every cut spike on the damaged side of the rail was destroyed. Again, we have had some derailments where it is reasonably certain that bad accidents were prevented by screw spikes in some of the ties holding the rails in position, whereas the cut spikes in the other ties were destroyed. With the first tie plates used, without supports for the spike heads on the inside of the rail, we did have some spikes badly bent by derailed wheels, thus causing no little delay in their removal.

We have as yet had but few cases with screw spike construction where the tracks have been found to be wide gage, due to spreading the rails, and these have been on sharp curves, where shortleaf yellow pine ties were used in renewals and where only a few screw spike fastenings were placed per rail length. It should, of course, be understood that there are some exceptional places on the railway where any metal parts, irrespective of whether they are cut spikes, screw spikes, bolts, etc., even when thoroughly protected and reinforced by channel plates or other devices, will be cut off or will fail to hold track, but such exceptional cases should not be taken as evidence of the success or failure of any holding device. On the other hand, we have many cases where the rails could no longer be held to safe gage with cut spike fastenings, when the installation of screw spikes and flat-bottom tie plates have not only made safe track, but materially lengthened the life of the ties, bridge and switch timbers. A good many cases of this kind occurred in the Hoboken Terminal. Steam-seasoned creosoted switch and track ties were laid out of face in 1906; the rail fastenings consisted of cut spikes and Wolhaupter flange plates. After six years' service it was necessary in numerous instances to replace the plates and cut spikes with flat-bottom tie plates and screw spikes to get any further service out of the timber. At the present time, due to shattering of the timber, the screw spikes are failing to hold the rail, as might have been expected. As to relaying rail, or removing broken rails, it is to be expected that more time will be consumed in doing the work. In other respects the conditions are no different from those experienced with cut spikes.

It is not the intention to convey the impression that positive conclusions can be reached from the experience thus far gained. It does seem advisable, however, to relate more or less in detail the facts which have thus far developed, and from these facts draw such conclusions as the evidence will warrant.

The through passenger trains are handled by Pacific type locomotives, weighing 227 tons. Fast freights are handled by Pacific type locomotives, weighing 228 tons. The standard heavy freight engine is of the Mikado type, weighing 238 tons. The axle load per driver on passenger and fast-freight engines is from 62,000 to 63,000 lb., and 59,500 lb. on the Mikado engines.

REASONS FOR ADOPTING SCREW SPIKES

The Lackawanna first commenced to creosote crossties on an extensive scale in 1910. During 1910 and since that time all main and sidetrack renewals have been made with creosoted ties, with the exception of the chestnut ties which were available. These chestnut ties were used in side-tracks and on branch lines, where the service is light.

From 1905 to 1909 many bridge-tie renewals were made with longleaf yellow pine, treated with 12 lb. of creosote oil per cu. ft. These ties were steamed at a 25-lb. pressure for an average of eight hours before treatment. Wolhaupter flange tie plates (6 in. by 8½ in. by ⅜ in.) were placed on the bridge ties, with the idea of protecting them. The dimensions of the ties varied with the bridge structure and were from 8 in. by 8 in. to 10 in. by 10 in. and 8 in. by 16 in.

On the main-line bridges none of the treated bridge ties has lasted to exceed 8 years. Many of them were renewed in 6 and 7 years. In no case was the timber decayed, but the failure was due to the shattering of the wood fibers under the rail seat and tie plates. As stated above, these were all longleaf yellow pine ties, with a very small percentage of sap. We have attributed this failure to the fiber being injured by the steaming process before treatment, and to the destructive action of the flanges on the tie plates. Five hundred and thirty-five of these ties (8 in. by 12 in.) were placed on the deck-plate girder bridge No. 241.56, eastbound track, Buffalo division, in 1906, and had to be renewed in 1914. Untreated ties of the same size, and purchased under the same specifications, were placed in the westbound track of the same bridge in 1905 and are still in service and in fairly good condition. The old flange tie plates were removed from the deck of both tracks in 1910 and replaced with flat-bottom plates and screw spikes.

For several years past we have placed very few chestnut ties in main-line tracks. It was found that they did not last to exceed 5 or 6 years, on account of the rail and tie plates cutting through them very rapidly. These ties give excellent service and last many years in yard tracks or on branch lines where the traffic is light.

As far as possible, hardwood ties are used on curved track. Longleaf yellow pine ties are generally used throughout on straight track. They are used not because they are preferable to hardwoods, but on account of the difficulty of getting a sufficient supply of hardwoods. A considerable number of loblolly and wide-ringed shortleaf pine ties were treated and placed in various services. However, unless otherwise stated, sap longleaf pine ties are referred to where pine ties are mentioned here. A good many gum, beech and maple ties were treated and placed in 1910, many in sharp curves.

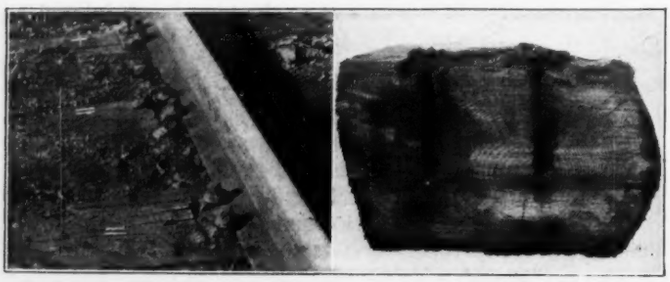
It was found, after some years' experience, that much dam-

*Abstracted from Bulletin 175 of the American Railway Engineering Association for March, 1915.

age was done to the ties by the use of flange tie plates. It was, therefore, concluded that their use should not be further considered, either in connection with treated or untreated timber. A good flange plate, or something equivalent thereto in actual holding power, is absolutely necessary to hold gage on many of the sharp curves. After a careful investigation of all available data on screw spikes, it was concluded to adopt them as a means of holding track to gage, and thus permit the use of a flat-bottom tie plate which would not destroy the fibers of the tie. Hence, since the spring of 1910, screw spikes and flat-bottom plates have been used generally in all ties placed in main tracks and in heavy-running yard tracks and leads, but not in light-yard tracks. In such tracks cut spikes and tie plates are used. In no case have screw spikes been used without tie plates.

It is necessary to have a tie plate of sufficient size to provide a safe bearing area for the weakest kind of wood used. As the main-track ties are 7 in. by 9 in. by 8 ft. 6 in., it was not considered advisable to make the tie plates wider than 7 in. Often the very best pole ties have a face at the rail seat of 7 in. or less, and, therefore, any excess in width of tie plate over 7 in. would be a waste of material. It is, therefore, quite evident that the tie plate must be of good length in order to provide a safe bearing area for all classes of wood.

The first tie plates which were rolled for our screw-spike construction were 7 in. by 10¼ in. by ½ in., with raised lugs to support the heads of two screw spikes and with an intermediate shoulder on the outside of the rail. The plates were smooth on the bottom, and did not have a shoulder or raised lug for the screw-spike head on the inside of the rail. The following season the plates were lengthened to 10⅝ in. and made ⅝ in. thick, with lugs for the inside screw spikes. Two holes were also punched for lag screws, one at each end. We had some doubt at first whether it would be possible to keep the flat-bottom plates from rattling and causing unnecessary noise in service. Furthermore, it would seem reasonable that the least possible wear between the tie plate and the tie would be the ideal condition. This can best be obtained by securely fastening the tie plate to the tie. If the raised lug for supporting the head of the screw spike is sufficiently high and of the proper shape to hold the head of the spike firmly, the tie plate will be held firmly to the tie, and most of the



Two Pine Ties Marked = Placed in 1912, Gum Tie Marked + Placed in 1910 on 4 deg. Curve, With 5 in. Elevation on 1.4 Per Cent Descending Grade. Traffic Per Annum, 12,000,000 Tons. Track Held to Perfect Gage. Photograph at Right Shows Cross Section of One of These Pine Ties and Perfect Condition of Wood Under the Tie Plate

wear will take place between the rail and the tie plate, rather than between the tie plate and the tie. We had considerable difficulty at first in getting the lugs rolled sufficiently high to allow for play between the head of the spike and the rail base, and for this reason it was considered that the additional lag screws might be necessary in order to more securely hold the tie plate. These lag screws have not been used, excepting in certain cases for experimental purposes. It has been found that, with very few exceptions, tie plates do not rattle and plates with a good support for the screw-spike head can now be rolled.

It is quite evident that so long a plate must have considerable thickness to avoid the possibility of buckling. The first plates rolled were ½ in. thick; they were at once increased to ⅝ in. and about a year ago we again increased them to ¾ in. in thickness.

The holes for the screw spikes on the shoulder side of the tie plate are punched slightly back of the line of the shoulder, in order to prevent the neck of the screw spike from being cut by the rail base. This method was also found to be of great advantage in case of derailment, where the ties are slued. Otherwise, the base of the rail will cut into the screw spike, making it very difficult to remove from the tie.

At first some difficulty was experienced in getting the holes

The High Rail on a 7 deg. Curve With 8 in. Elevation Carrying 20,000,000 Tons Per Annum. No Indication of Lateral Movement of Tie Plates or Spikes or of Plates Cutting Into the Ties Which Were Placed in 1910

punched at the proper point on account of the great depth of metal through the lug of a thick tie plate. The hole must be punched from the top down, so as to keep the smallest diameter of the hole at the top of the lug, or directly under the screw spike head, and to prevent damage to the lug.

During the first two years that screw spikes were used, joint plates were made of malleable iron, angle bars were slotted for cut spikes, and one screw spike was used on the outside of the outer angle bar. Since that time all plates have been rolled, and screw spikes are used in anglebar slots, with one extra spike on outside of the anglebar.

SCREW SPIKES

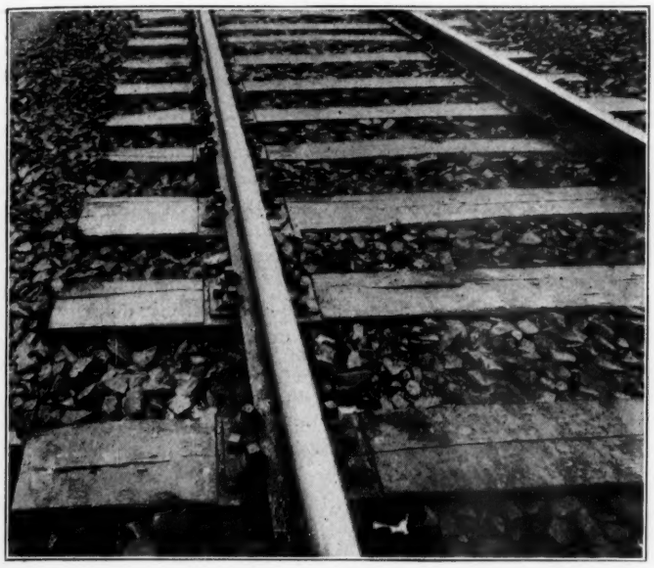
The first change from the standard cut spike fastening was made in February, 1909, when a new double-track tunnel through Bergen Hill, Jersey City, was put in operation. This tunnel has a concrete roadbed, with short, creosoted, yellow pine ties. Flat tie plates (6 in. by 9 in. by ½ in.) were used, and the rail was fastened with a lag screw and clip. The plates, clips and screws were made at the company's frog and switch shop. New rail has now been laid on the tracks in question. The old fastenings have been replaced with heavy plates and screw spikes.

A heavy traffic is handled through this tunnel, including a large amount of refrigerator business. Although considerable difficulty from corrosion had been experienced in the old tunnel, the lag screws in question were firm in the wood, and no difficulty was encountered in removing them with socket wrenches. These lag screws held the rails to gage—there was no sign whatever of lateral movement.

We have been very careful not to vary the thread of the spikes used, on account of the possibility of destroying the threads formed in the wood, in case a new screw spike was inserted in an old hole. The size of the heads of the screw spikes have been somewhat increased from those first used, on account of the great deterioration from rust caused by

brine dripping at certain points on the line. This difficulty has not been experienced generally. The worst places were those in the immediate vicinity of icing stations. This is a difficulty which could and should be entirely eliminated by using containers under refrigerator cars, thus avoiding this unnecessary damage not only to track fastenings, but to bridge structures, interlocking, etc.

The first year that screw spikes were used, an "Ajax" hand



Chestnut Ties Placed in Tangent Track Carrying 12,000,000 Tons Per Annum in 1912. Ties Adzed and Bored Before Insertion, and Are Still in Excellent Condition

machine was used for boring all ties in the field. A template was used to spot the holes. Creosote oil was poured into all the holes as soon as bored. In 1911 a Greenlee Brothers boring and adzing machine was installed at the creosoting plant. This machine operated more or less successfully, but was not of sufficient capacity nor heavy enough in construction to successfully handle heavy hardwood ties. Accordingly, two new and larger machines, of the same make, were installed early in 1913. These machines have operated successfully, and have adzed and bored 5,000 ties per day without difficulty. During 1914 we adzed and bored 523,935 ties.

The cost per tie for adzing and boring, including the interest on the investment, depreciation, operation, running repairs, electrical current for operating the machines and trams while the latter are taking ties to and from the machines, does not exceed 1½ cents per tie. Holes are also bored for cut spikes used in yard and industrial tracks of light service.

Some service tests are being made with different kinds of linings. The Thiollier helical lining, a steel spiral screw of the same pitch as the threads of the screw spike with the inside diameter the same as the core of the spike, provides good holding power, but to date we have found considerable difficulty in applying the device. We are also using a malleable lining with inner threads to correspond to the pitch of the screw spike and outer threads to form a new contact with the fibers of the wood. The lower end of this lining is cut in three parts and spreads as the screw spike is forced into place. This device is not hard to apply. The old hole has to be enlarged and the lining inserted. All of the devices so far tested have been placed in new timber, as we have as yet had no occasion to make such applications in old ties where the screws have become loose.

A test has also just been started with plates bolted to soft pine ties. A strap holds the two bolts together on the bottom, while heavy nut locks of a special design hold the plate firmly to the tie. The rail is held in place by a hook shoulder on the inside and a screw spike on the outside. With longleaf yellow pine, birch, gum, oak and other hardwood ties, it is not thought that any such appliance will be necessary to get the full value of the ties, excepting, possibly, in some cases on sharp curves with excessive traffic. On straight track the rail can be regaged at any time that this is necessry by using the two spare holes in the plates and boring new holes in the ties. After nearly five years of service there is no indication that this will have to be done for some years to come, if at all.

COST

The following data are a summation of the labor costs in connection with the construction of the Lackawanna Railroad of New Jersey. These figures cover the entire line, amounting to a mileage of approximately sixty miles of main track:

	Per mile
Cost of boring by hand in the field, 2,880 ties at $.035	$ 100.80
Cost of applying 11,520 screw spikes at $.019	218.88
Cost of laying track, less boring and placing screw spikes at $.085 per foot	448.80
Cost of surfacing 5,280 feet track at $.17 per foot	897.60
Average cost of labor per mile of main track	$1,666.08

The above figures include the entire labor cost for putting the track in finished condition, but do not include any labor cost for the distribution of materials. It will also be noted that the cost of boring ties in the field on the above work amounted to 3½ cents per tie, whereas the boring and adzing of ties, which is now done before treatment, has not cost to exceed 1½ cents per tie.

CONCLUSIONS AND PRECAUTIONS TO BE TAKEN IN APPLYING

Ties

(1) Treated beech, birch, gum, hard maple, elm and probably other similar woods may be safely used with oak on sharp curves where the traffic is especially heavy.

(2) From an economic standpoint, softwood ties, such as loblolly pine, should not be used on tracks of excessive traffic,

Effects of a Derailment Where Screw Spikes Were Partially Used. Weber Joint Badly Damaged. All Cut Spikes Had to Be Replaced, But Original Screw Spikes Show No Damage

nor is it advisable to use them on sharp curves with moderately heavy traffic. An expensive fastening device, such as an extra large and heavy tie plate or chair, securely fastened to the tie by fastenings independent of the spikes securing the rail, with sufficient room for rail movement on the tie plate, thus reducing the movement between the plate and tie to a minimum, would probably make it practicable to use softwood ties on straight track and light curves with moderately heavy traffic. It is not believed, however, that loblolly pine, or similar ties, can be economically used with good results on heavy curves, regardless of the style of fastenings.

(3) As a rule, with woods which it will pay to treat, the

poorer the quality of the timber the more elaborate and expensive must be the fastening if the mechanical life of the tie is made to approach the life of the treated timber.

(4) The hardest track to maintain, from a tie standpoint, is that on sharp curves, elevated for high-speed trains, where the speed of freight trains is restricted on account of grade conditions. Where traffic is especially heavy, such curves should be provided with the best of hardwood ties.

Tie Plates

(1) Tie plates should be used on all ties where screw spikes are used.

(2) The tie plates should project well beyond the base of the rail on the outside and less on the inside to counteract the tendency of rail to roll out.

(3) As a rule, the required thickness of the tie plates will depend upon their projection beyond the base of the rail, and the traffic.

(4) Four holes should be provided for screw spikes, so that two extra holes will be available if needed.

(5) All holes should be punched from the top down and be as neat a fit for screw spikes as consistent, to make all screw spikes act together in resisting lateral pressure. The outside screw spikes should be so protected by the shoulder on the plate as to prevent the rail base from cutting into the screw spike neck; otherwise, in case of derailment and slued ties, it will be found impossible to remove the spikes without first straightening the ties.

(6) A raised lug, or shoulder, both inside and outside of the rail base, should be provided to give support to the screw-spike heads. This shoulder assists in holding gage and materially reduces the breakage of spikes and damage to track in case of derailment.

Spikes

(1) The size of screw spikes and the design of the thread should be carefully considered before a screw spike is adopted. Thereafter no changes should be made; otherwise the new screw spikes cannot be used in old holes without damaging the wood fiber.

(2) Where salt brine drippings are excessive, screw-spike heads must be made sufficiently large; otherwise there may be difficulty in the future in removing the screw spikes from the track, due to corrosion. During the nearly five years' service no screw spikes have been found that were rusted within the tie, and there was no rust to speak of below the head, although some spike heads were rusted so badly that they could not be removed with the standard tool.

(3) The screw-spike head should have tapering sides to prevent turning in the wrench socket after the size of the head has been diminished by rust.

(4) Any mechanical device for setting down screw spikes must automatically release when the screw spike is seated; otherwise the screw spike is apt to be damaged in case of hardwood or the wood fibers destroyed in case of softwood.

(5) Very little trouble is experienced by screw-spike heads breaking off, either on account of track movement or derailed equipment. The heads are, at times, damaged to considerable extent by derailments, but as a rule the spikes are not broken, nor is their holding power affected. Where screw spikes are broken off, a device for extracting the broken portion from the old hole without injury to the wood threads would be a valuable appliance.

(6) When screw spikes are fully seated, no further strain should be put on them, as this will tend to destroy the threads in the wood or injure the spikes.

Holes for Screw Spikes

(1) All ties should be bored at the treating plant before treatment. This can be done while the ties are being adzed, and not only insures that the holes are bored deep enough, but assures good treatment of all wood adjacent to the holes.

(2) Where the ties are bored before treatment, the track must be at proper gage before the ties can be placed.

(3) The holes for screw spikes should be of proper dimensions for the wood used, with due regard to the size of spike.

(4) A limited number of holes can be bored with one bit, after which its size will diminish so as to make it too small.

(5) Holes should be bored somewhat deeper than the length of the screw spike. There is no serious objection to boring the holes clear through the ties.

Gage

(1) With oak, birch, hard maple, gum or longleaf yellow pine ties, gage can be maintained with flat-bottom plates, using two screw spikes on tangents and two or three on curves.

(2) Heavy curves elevated for high speed, where heavy freight trains move at a slow rate of speed, are the hardest track to keep to gage.

(3) Double spiking should be done on the inside of the rail.

(4) Not only is the lateral and vertical resistance of a screw spike greater than that of a cut spike when both are first applied, but the lateral and vertical resistance of a loose screw spike is considerably greater than the lateral and vertical resistance of a loose cut spike.

(5) When the threads in the tie are entirely destroyed, a screw lining (any one of several different varieties) may be used with good results.

General

(1) All ties should be bored and adzed before treatment. This insures good gage, a perfect bearing for the tie plates and good impregnation under the rail and around the holes.

(2) In placing screw spikes, they should be driven by hammer only far enough to make the threads take hold. If rigid instructions are not enforced, laborers will overdrive spikes and so destroy the wood fibers near the top of the holes.

(3) Screw spikes with flat-bottom plates on hardwood ties will hold track to gage on sharp curves under heavy traffic. The holding power of screw spikes in hardwood ties is not materially reduced after more than four years' service.

(4) No screw spikes have ever been found so loose that they could be easily pulled out of the holes, and but few have been discovered which could be as easily extracted as a newly-driven cut spike. In no case, except with loblolly pine ties, have the threads in the wood been found weakened.

(5) Screw spikes in maintenance work can be used most economically where all rail is of a standard pattern, so that regaging of track is not necessary in relaying rail.

(6) Slight irregularities in frozen track are likely to throw an excessive strain on screw spikes where there are but a few mixed with cut spikes.

(7) The best results with the screw spikes can be expected in new construction, and where the number of screw spikes in tie renewals predominate over cut spikes.

(8) In relaying rail, cut spikes should never be driven in old screw-spike holes, if the holes are to be used again for screw spikes.

(9) No effort should be made to draw up a low tie with screw spikes when the roadbed and ballast are frozen solid.

(10) Screw spikes do not have to be set down continually, as do cut spikes, but should be gone over and set down properly after the plates are seated in the tie.

(11) Flat-bottom plates with raised shoulders or lugs for the screw-spike heads make but little noise and do not rattle at all where ties are adzed before treatment.

(12) It cannot be expected that the full life of all creosoted softwood ties, such as loblolly pine, will be realized without providing expensive fastenings from the start, and then it will probably be necessary to add some further device at a later date. Probably the most practical and least expensive device will prove to be one or the other of the lining devices to be placed in worn out spike holes.

(13) The use of screw spikes for the past five years has not made it necessary to increase the number of section men.

(14) Whether or not it will pay to use screw spikes will depend upon the cost of ties, their probable life and the amount of traffic.

The Effect of the War on Timber Preservation

Twenty-Five Per Cent Reduction in Creosote Supply Forces Use of Other Materials and Closing of Plants

One of the direct effects of the European war on the American railways has been the partial demoralization of the timber-treating industry following the cutting off of a large part of the supply of preservatives. The railways are the largest consumers of treated timber. Over 80 per cent of the total of 153,000,000 cu. ft. of timber treated in 1913 consisted of cross-ties, while over one-half of the remainder comprised piling, bridge timbers and other materials consumed directly by the railways. They are also large plant operators, owning directly 27 out of a total of approximately 95 plants in active operation, while they are the main customers of the others, contracting for the entire output of many of the privately owned plants. Any interference with the operation of these wood preserving plants is therefore of direct concern to the railways. Because of the wide variety of statements regarding present conditions in this field and the confusion resulting thereform, we have communicated with the large operators and present the following information as a resume of the present situation.

THE MATERIALS USED

Ever since the inauguration of wood preservation on a commercial scale about 1885 the greatest attention has been devoted to the treatment of ties and the largest output of treated material has been in this form. Starting with about 120,000 ties in 1885, the output of treated ties has risen from year to year until it reached 2,800,000 ties in 1900, or 3.2 per cent of the total requirements of the railways. Since that date the industry has developed even faster, until in 1914, 41,095,655 ties were treated, which was nearly 30 per cent of the entire number used. Thus, both the absolute number of ties and the percentage of the total treated is increasing rapidly as the service results become more generally known and the cost of untreated timber increases. The growing scarcity of hard wood and the possibility of securing a relatively long life by treating the so-called inferior woods have also helped this increase.

The two preservatives most commonly used are zinc chloride and creosote oil, forming 97 per cent of the total quantity of all preservatives consumed. Zinc chloride was applied almost entirely at first, and it has been estimated that of the 15,000,000 ties treated previous to 1900, zinc chloride was injected into all but 500,000. Even as late as 1905 approximately 90 per cent of the ties were treated with this material. Since that date creosote has been more widely adopted, although the consumption of zinc chloride has continued to increase, until in 1913, 26,466,800 lb. of dry zinc chloride was used.

The creosote treatment has been in marked favor, especially during the past five years, and its used has increased rapidly. Nearly all of the new plants have been designed and built for this treatment. Starting with less than 3 per cent of the total output of treated ties previous to 1900, and with only 10 per cent in 1905, this increased to approximately 70 per cent of all the ties treated in 1913. This has naturally resulted in a very great increase in the demand for this oil. In 1903 about 8,000,000 gal. were used, which was increased to 56,000,000 gal. in 1908, 83,000,000 gal. in 1912 and 108,000,000 gal. in 1913, practically doubling in the last five years.

Creosote is a by-product of the distillation of coal tar. As such its production is only practicable commercially when there is a demand for pitch and the other primary products. A sufficient quantity of crude tar is produced in the United States to provide all the creosote needed for timber preservation. However, the normal price of creosote oil does not warrant the distillation of the coal tar for this product alone. As a result a quantity of tar is refined just sufficient to provide the pitch and other primary products for which there is home and export demand. This condition now retards the distillation of creosote and will continue to do so until the industries of this country are sufficiently developed to create a demand for the pitches and other coal-tar products.

Previous to 1905, when relatively small amounts of creosote were used in wood preservation, over one-half of the oil required was manufactured in the United States; but with the rapid increase in the demand the proportion of domestic creosote fell to 29 per cent in 1910 and 1911. Since that time the production of domestic creosote has been increased about 10,000,000 gal. per year, resulting from the increased activity of older firms and the entrance of new firms into this field. As a result the percentage of imported oil fell to 62 per cent in 1913. However, large as the recent increase in domestic production has been, it has not kept pace with the increased demand and the importation of foreign creosote has increased from year to year. The importation of foreign oils will therefore continue to be essential to the industry of wood preservation for many years to come.

The imported oil comes almost exclusively from England, Belgium and Germany. Germany furnishes about 15 per cent of our total requirements and Belgium a considerably less amount. Nearly half of all the oil used in this country comes from England. The total amount imported has risen from 38,000,000 gal. in 1908 to 51,000,000 gal. in 1911, and 66,000,000 gal. in 1913. This large surplus of oil available for export results primarily from the extensive demand and development of manufactories of coal-tar products in Europe, enabling creosote oil to be produced economically as a by-product.

THE RESULTS OF THE WAR

When the European war broke out last August the United States was consuming about 110,000,000 gal. of creosote annually, of which nearly 70,000,000 gal. was being imported. The plants along the south Atlantic coast depended almost entirely upon imported oil. Those along the north Atlantic coast were securing about half of their requirements from domestic sources, while those in the interior were using domestic oil very largely. The plants along the Pacific coast were also dependent almost entirely upon imported oil.

At the beginning of hostilities, embargoes were placed on the exportation of creosote from the belligerent countries. The English embargo was soon raised, but it is still impossible to secure any oil from Germany or Belgium, and this condition will undoubtedly exist until the close of the war, owing to England's control of the sea. While there is now no restriction on the shipment of oil from England, it is very difficult to secure boats to bring it to this country, as the British Admiralty has commandeered for its own uses many tank steamers formerly engaged in this service, even after they were loaded, and is still doing so. One recent report showed a list of over 85 tank steamers which had been withdrawn from commercial service in this way. Importers of creosote oil and railroads which purchase their oil abroad directly are both suffering from this condition. One railroad had two cargoes confiscated at sea last fall. Other roads have had boats taken repeatedly after being placed for loading and, in some cases, after being loaded. Thus, while large quantities of foreign oils are available and are accumulating in storage, they are largely unavailable for the plants in this country because of transportation conditions.

Consequently, the amount of oil imported for the six months from August, 1914, to January, 1915, inclusive, decreased to 17,000,000 gal. as compared with 27,000,000 gal. for the same period a year ago, a loss of 37 per cent, and it is still decreasing as the demands of the English government for tank steamers

become more urgent. Thus in January only 200,000 gal. of creosote oil was received in this country. As approximately 62 per cent of the creosote consumed in the United States is imported, this is equivalent to a total shortage of at least 25 per cent.

The effects of this situation on the individual plants in this country have varied widely. The most favorably situated are those which have contracted regularly in advance with domestic producers for their entire requirements. Thus, their source of supply is not disturbed and they have suffered no direct ill effects. In fact, from a competitive standpoint their condition has been improved. Other plants normally contract for a portion of their requirements with the domestic producers and import the balance. At times such as these the home manufacturers naturally favor their regular customers in the sale of oils previously uncontracted. Such plants are therefore affected by this shortage only to a limited degree.

The decrease in the supply is felt most seriously by those plants which secure a large part or all of their supply from abroad. Measures adopted by these operators depend largely upon the purposes for which their timber is treated. For those plants which treat piling, paving blocks, etc., which require a creosote treatment, there is no alternative but to close down when the supply of oil is exhausted, and a number of plants have already been forced to this extremity.

Various expedients have been adopted to conserve the supply of creosote. A number of plants have changed from the full cell to the Reuping or other empty cell processes to reduce the consumption of oil. At least two roads have reduced the unit quantities of oil injected into the timber without changing the process. There has also been a distinct tendency towards the adoption of other oils previously considered inferior, such as water-gas tar creosote. One large plant is planning to substitute up to 20 per cent of this for coal tar creosote. The addition of refined coal tar to creosote, which has met with increasing adoption during recent years, has received a decided impetus under present conditions.

Since, as stated above, over 80 per cent of all the timber treated consists of ties, and since over 25 per cent of all ties treated are impregnated with zinc chloride under normal conditions, the most obvious and readily applied method of relief in the treatment of crossties is the substitution of zinc chloride for creosote treatment. As a result a considerable number of large plants have been rearranged and are now preserving ties in this manner. However, this is not without its difficulty, as the cost of zinc chloride has risen materially, due to the increased demand and to the difficulty in securing spelter because of the war. The shortage of this material, however, has not been serious up to the present time.

Probably the most important single factor contributing to the relief of the shortage has been the depression existing in railway and commercial circles, making retrenchments in expenditures for improvements necessary, and holding up much new work. This has materially reduced the demand for treated timber, and thereby for creosote. Largely for this reason one road was enabled to close down its plant entirely for 2½ months. Another reduced the hours of operation from 20 to 10 per day, and several others have made similar reductions.

In view of the shortage of foreign creosote and the serious situation with which many of the plants have been confronted, there has naturally arisen a strong demand from the consumers for an increased output of creosote on the part of the domestic manufacturers. This demand has served to increase the price of the domestic oil at least 35 per cent, which has served as an incentive toward increasing the production. While the manufacturers are believed to be making strong efforts to produce the largest possible amount of creosote oil, the depression in general business conditions has caused a decreased demand for pitch and other primary products in this country and has very materially reduced the export sale. For this reason it is not commercially practicable to entirely or even largely offset the shortage resulting from the decrease in European importation by increased home production in so short a time.

Furthermore, the present conditions are but temporary, and at the close of the war the large quantities of creosote now accumulating in England and Germany will be released for shipment to this country. This will probably result in a material reduction in the price of oil even below that existing previous to the war. In spite of the evident advantages to the timber-treating industry of a greatly increased domestic production now, one can only expect to see a normal development in our domestic production which will keep pace with the home and export demands for pitch and other primary products. With the various relief measures which have been adopted, the situation should become little worse than now existing, even though the war continues for some time:

The following brief abstracts from information received directly from the larger railway treating plants in this country, show the wide variety of conditions existing.

"We have not substituted any other process of treatment. When our oil supply ran so low that there was likelihood of our running out, our plants were cut from 20 hours to 10 hours per day. We have arranged for the purchase of a few hundred thousand gallons of domestic creosote that will meet the A. R. E. A. grade 1 specifications. We have also contracted for some water-gas tar which we expect to use at the rate of 20 per cent. The latter plan was decided upon before the shortage of creosote became apparent."

"When the war broke out we had just received approximately one-fourth of our annual requirement of creosote oil. However, we immediately set about making changes that would conserve this supply and did not use a gallon more creosote than we had to in order to save the timber on hand ready for treatment. We immediately rebuilt our plants to use zinc chloride, and are now operating by that method, using the creosote we have only for bridge timber and piling."

"No definite measures have been adopted to relieve the shortage, although the retrenchment in renewal and new work has decreased the output of the plant. We are also experimenting with other processes, more with a view to decreasing the cost of treatment than of conserving the supply of creosote as our present stock is sufficient for at least 12 months."

"We have a sufficient supply of creosote on hand to operate our plant during 1915. We have reduced the quantity of creosote used from 3 lb. to 2 lb. per cu. ft., using the same quantity of zinc chloride, namely ½-lb. per cu. ft., and employing the Card process. We are considering the use of a certain percentage of water-gas tar creosote mixed with coal-tar creosote and zinc chloride. We have not in any way decreased our output. On the other hand, we have been and are working our plant to the maximum capacity."

"We have not changed our process, and while we have not decreased our crosstie output, we have postponed the treatment of some construction material, such as piling and dock timber. This postponement, however, is also partly due to the reduced earnings of our company for the past six months."

"During 1914 we received one shipment of 500,000 gal. of creosote by tank steamer from England. We experienced considerable trouble in securing this shipment and had two cargoes confiscated at sea by the English government."

"We have adopted no method to reduce the shortage except to reduce the quantity of oil left in the tie from 6 lb. to 5 lb. per cu. ft. This reduction was not due entirely to difficulty in securing creosote, for we believe that with our climate and soft pine ties, 5 lb. of creosote will preserve the tie against decay until it fails otherwise."

"We formerly used the full cell process on our material, but since August 1 we have used the Reuping process for all ties. We have also treated some ties with zinc chloride. We still treat most of the bridge timber by the full cell process. Unless boats can be chartered we will be short of oil this year."

"We have not been compelled to resort to any measures to

relieve the shortage, having sufficient oil on hand to treat our immediate requirements. However, should the price of the creosote we use rise too high we can resort to a heavy zinc chloride treatment for certain dimension timbers for inland use."

"The European war has not interfered with our creosote supply in any way, as all of the oil used in our plant is domestic."

"We do not know where our supply of oil is coming from this year or whether we will secure any at all. As soon as the war started we began to conserve our supply of creosote oil for only the most important work, and are now using considerable untreated timber."

"We have substituted for the Card process, chloride of zinc for the treatment of ties and will continue to use this until creosote can be purchased at a reasonable price."

"It has not been necessary for us to adopt any unusual measures to secure a supply of creosote oil, as our demands are covered by contract with plants in this country. We are curtailing our bridge work this year, so that we will not use more than two-thirds as much oil as we used last year."

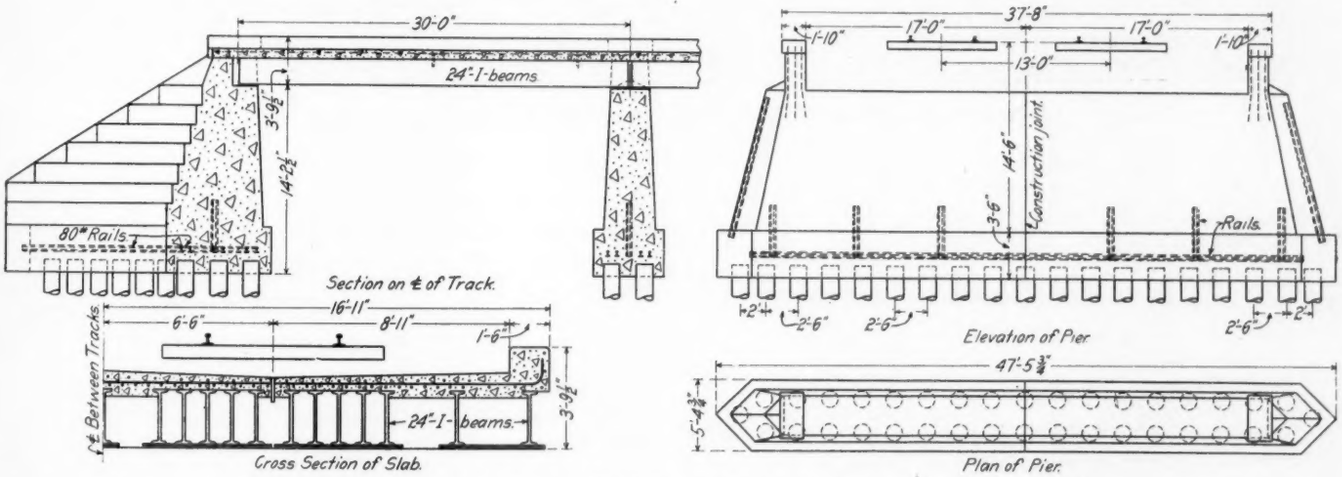
NEW B. R. & P. STRUCTURE ACROSS ALLEGHENY RIVER AT RIVERSIDE, N. Y.

During the past year the Buffalo, Rochester & Pittsburgh has replaced its old bridge across the Allegheny river at Riverside, N. Y., with a new structure designed according to the latest standards of this road. The old structure consisted of a gauntleted single track steel through pin-connected truss of the camel back type 212 ft. long supported on stone masonry with a double-track, frame-trestle approach 532 ft. 8 in. long. The truss was designed for Cooper's E-40 loading and weighed 212 tons. In addition to being gauntleted the old structure was too light for the modern equipment. It was replaced with a 212 ft. double-track, steel-riveted, through-Warren-truss span and a concrete and steel approach viaduct 504 ft. 4 in. long. The new truss span was designed for Cooper's E-60 loading and weighs 643 tons.

The pier and the abutment under the old single track span were of stone masonry supported on piles and designed for double track. Only short extensions were therefore necessary to comply with present standards. These were built of concrete, with which material the old masonry was also encased.

The viaduct consists of 17 spans each 30 ft. long supported on concrete piers resting on timber piles. The piles project 12 in. into a concrete cap 5 ft. 4¾ in. wide, 3 ft. 6 in. high and 47 ft. 5¾ in. long between extreme end points. These caps are reinforced longitudinally with four 80-lb. rails placed two over each pile. These caps are also bonded to the pier above by seven 4-ft. sections of rails set vertically at intervals of 6 ft. 6 in.

The deck of the viaduct consists of 25 24-in. 100-lb. I-beams arranged in clusters and supporting concrete slabs, as shown in the accompanying cross section. These slabs, which are 30 ft. long and 33 ft. 10 in. wide, were constructed in place in half sections for each track separately. An interesting feature of their design is the width of roadway provided. The tracks are spaced 13 ft. between centers, leaving a distance of 10 ft. 5 in. from the center of the adjacent track to the outer edge of the parapet. The tops of the slabs are sloped each way towards the center of each track where drainage outlets are provided at intervals of approximately 8 ft. The bottoms of the slabs extend down to enclose the outer side of the upper flange of the outside I-beams of each cluster, locking the I-beams and the slabs into one unit.



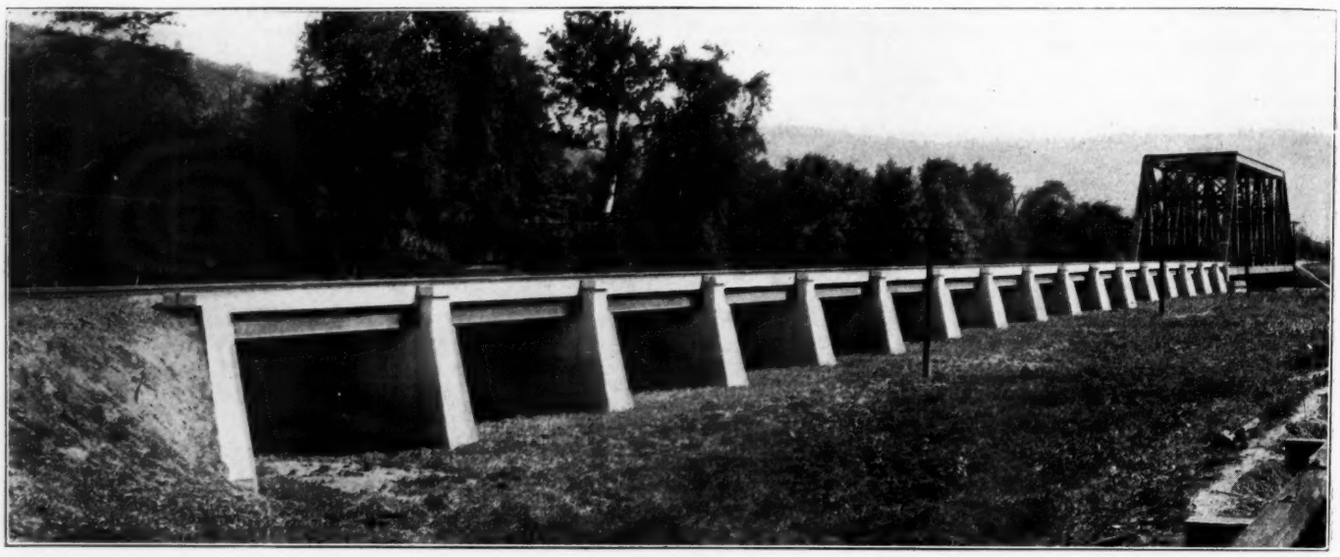
Elevation and Sections of Buffalo, Rochester & Pittsburgh Steel and Concrete Trestle

In renewing the river span, traffic was carried on timber falsework. In the reconstruction of the approach viaduct, the east

Views of Completed Steel Span and Concrete Deck Approach Viaduct

second track was removed and the gauntlet extended across the viaduct. The new piers were so spaced that they did not disturb any of the old timber bents except for a short distance at the south end next to the river span, where it was necessary to place temporary timber bents. One-half of the structure was then built complete, after which the gauntleted tracks were shifted onto the new structure and the other half completed.

The plans for this work were prepared under the direction of E. F. Robinson, chief engineer, Buffalo, Rochester & Pittsburgh, and W. F. Pond, office engineer. The steel was fabricated by the American Bridge Company, and the truss span was erected by it. All other work was carried on by company forces under the direction of G. H. Stewart, master mason, and Charles Scott, supervisor of bridges and buildings.



New Buffalo, Rochester & Pittsburgh Bridge Across the Allegheny River

PRODUCTION OF RAILS IN THE UNITED STATES IN 1914

The Bureau of Statistics of the American Iron & Steel Institute has just issued a bulletin giving the production of rails last year based on statistics furnished by the various manufacturers. The most striking thing about these statistics is the decrease of over 1,557,000 tons, or 44. per cent in the production of rails as compared with the preceding year. This is the greatest reduction in the 18 years these statistics have been compiled, with the exception of 1908, when the output decreased 1,612,000 tons.

PRODUCTION OF RAILS BY PROCESSES, IN GROSS TONS, 1897-1914

Years	Open-hearth	Bessemer	Rerolled*	Electric	Iron	Total
1897.....	500	1,644,520	Included with Bessemer and open-hearth steel rails from 1897 to 1910 inclusive.	.....	2,872	1,647,892
1898.....	1,220	1,976,702		.....	3,319	1,981,241
1899.....	523	2,270,585		.....	1,592	2,272,700
1900.....	1,333	2,383,654		.....	695	2,385,682
1901.....	2,093	2,870,816		.....	1,730	2,874,639
1902.....	6,029	2,935,392		.....	6,512	2,947,933
1903.....	45,054	2,946,756		.....	667	2,992,477
1904.....	145,883	2,137,957		.....	871	2,284,711
1905.....	183,264	3,192,347		.....	318	3,375,929
1906.....	186,413	3,791,459		.....	15	3,977,887
1907.....	252,704	3,380,025		.....	925	3,633,654
1908.....	571,791	1,349,153		.....	71	1,921,015
1909.....	1,256,674	1,767,171		†	.....	3,023,845
1910.....	1,751,359	1,884,442		†	230	3,636,031
1911.....	1,676,923	1,053,420	91,751	462	234	2,822,790
1912.....	2,105,144	1,099,926	119,390	3,455	.....	3,327,915
1913.....	2,527,710	817,591	155,043	2,436	.....	3,502,780
1914.....	1,525,851	323,897	95,169	178	.....	1,945,095

*Rerolled from old steel rails and renewed rails which the manufacturers could not classify as Bessemer or open-hearth.

†Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

PRODUCTION OF RAILS, SHOWING DECREASE BY PROCESSES, 1913-1914

Kinds.	1914	Per cent	1913	Per cent	Decrease	Per cent
Open-hearth	1,525,851	78.45	2,527,710	72.16	1,001,859	39.64
Bessemer	323,897	16.65	817,591	23.34	493,694	60.38
All other	95,347	4.90	157,479	4.50	62,132	39.45
Total	1,945,095	100.00	3,502,780	100.00	1,557,685	44.47

The increase in the proportion of open hearth rails has continued rising from 72.16 in 1913 to 78.45 last year, while the production of Bessemer rails decreased from 23.3 per cent in 1913 to 16.7 per cent in 1914.

PRODUCTION OF RAILS BY WEIGHT PER YARD, 1897-1914

Years.	Under 45 lb.	45 and less than 85	85 lb. and over	Total. Gross tons
1897.....	88,896	1,223,435	335,561	1,647,892
1898.....	123,881	1,404,150	453,210	1,981,241
1899.....	133,836	1,559,340	579,524	2,272,700
1900.....	157,531	1,626,093	602,058	2,385,682
1901.....	155,406	2,225,411	493,822	2,874,639
1902.....	261,887	2,040,884	645,162	2,947,933
1903.....	221,262	1,603,088	1,168,127	2,992,477
1904.....	291,883	1,320,677	672,151	2,284,711
1905.....	228,252	1,601,624	1,546,053	3,375,929
1906.....	284,612	1,749,650	1,943,625	3,977,887
1907.....	295,838	1,569,985	1,767,831	3,633,654
1908.....	183,869	687,632	1,049,514	1,921,015
1909.....	255,726	1,024,856	1,743,263	3,023,845
1910.....	260,709	1,275,339	2,099,983	3,636,031
1911.....	218,758	1,067,696	1,536,336	2,822,790
1912.....	248,672	1,118,592	1,960,651	3,327,915
1913.....	*270,405	†967,313	2,265,062	3,502,780
1914.....	*238,423	†309,865	1,396,807	1,945,095

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

The production of Bessemer rails last year was only 22 per cent of the tonnage of open hearth rails.

PRODUCTION OF ALLOY-TREATED STEEL RAILS, 1909-1914

Years	Total production. Gross tons	Production by alloys: Titanium	Production by alloys: Other alloys	Production by processes: Open-hearth and electric	Production by processes: Bessemer	Production by weight: Under 45 lb.	Production by weight: 45 and under 85 lb.	Production by weight: 85 lb. and over
1909...	49,395	35,945	13,450	13,696	35,699	..	9,132	40,263
1910...	257,324	256,759	565	27,389	229,935	..	70,170	187,154
1911...	153,989	152,990	999	38,539	115,450	..	27,097	126,892
1912...	149,267	141,773	7,494	40,393	108,874	21	5,426	143,820
1913...	59,519	47,655	11,864	33,567	25,952	*91	†9,414	50,014
1914...	27,937	23,321	4,616	27,447	490	*14	†1,168	26,755

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

DANISH STATE RAILWAYS.—The report for the last financial year shows receipts amounting to $15,500,000 and an expenditure of about $13,000,000, in both cases the highest figures on record, the actual surplus being $2,425,000. The freight traffic shows an increase of 3.4 per cent and the passenger traffic of 1.2 per cent, compared with the previous year. The passenger traffic shows receipts of $6,700,000, of which about $1,050,000 arise from the through traffic. As regards the different classes in the passenger traffic, first class yields 0.1 per cent, second 8.6 per cent and third 91.3 per cent. At the end of the financial year in question the state railways in Denmark had a capital outlay of $79,000,000, of which capital the earnings represent about 3 per cent. As regards accidents during the year in question, there were killed, of passengers, railway servants and others, 31; 35 were severely injured, and 45 less severely.

Importance of Economical Methods of Renewing Ties

Three Timely Discussions Emphasizing the Possibilities for Conservation in this Important Expenditure

At this season of the year when the work of renewing ties is being actively pushed on most roads those in charge of this work can well afford to give it their personal attention because of the large amounts normally expended on this account and the resulting opportunities for waste or economy both in material and labor. The three discussions given below, prepared by men who have given this subject careful consideration, call attention to different phases of this problem, all of which are important.

AN ECONOMICAL METHOD OF RENEWING TIES

By "Roadmaster"

For a number of years I have followed the practice of jacking up the track 1½ to 2 in. when renewing ties and pulling out the old ties instead of digging them out and disturbing the original bed, as is commonly done. With this method I have materially reduced the unit cost of renewals, and this work has required less of the time of the section forces than the old method.

Many track men think that gravel or earth ballast will run under the ties when the track is jacked up. This is true only when the ballast is sandy or new, in which latter case the ties are also generally new and require few replacements. When the ballast has been in the track a year or longer it forms walls along the sides of the ties which are not easily disturbed. Although the track does not necessarily return at once to its original bed of its own weight unless the ballast is well packed or foul, this is an advantage, as the side-binding holds the track suspended until new ties are inserted. For this reason it is important that the new ties be put in before a train passes to avoid digging out the old bed afterward to get them in. The increasing use of tie plates resulting in reduced rail cutting is of assistance with this method, making it unnecessary to raise the track as great a distance as formerly as well as reducing the digging out of the old bed. In adopting this method I have found considerable difficulty in training the foremen to do this work properly, and it has been necessary to spend considerable time with them to insure that they understand and handle it correctly.

This method is equally applicable to dirt track and was originally developed here where less care is required than in ballasted track. I recall one section where two men with the foreman put in 1,250 hardwood ties in clay track in one month and left the old ties piled. This gang put in as many as 80 ties in a single day.

RENEWING TIES IN STONE AND EARTH BALLASTED TRACK

By P. J. McAndrews

Roadmaster, Chicago & North Western, Belle Plaine, Ia.

For the proper maintenance of track it is essential that good ties be provided and important that the work of renewing be done at the proper time. These considerations, taken in connection with the present high cost of the ties themselves and of the labor required to handle them, make the tie renewing program of a railway a matter of great importance. The exercise of good judgment and the use of systematic methods are necessary at each of the various steps from the date of making estimates until the completion of the season's work. Enough ties must be furnished to maintain the track properly and safely, but care must be taken to avoid the other extreme, which leads to a probable waste of material and labor. Supervising officers, to whom are entrusted the duty of making or approving requisitions for ties, have opportunity to and should observe conditions on their territory from time to time, thus being in a position to submit approximately correct estimates.

Before submitting estimates, section foremen and, if possible, supervisors should walk over their territories, carefully inspecting ties, marking such as appear decayed to the stage that would make renewal necessary the following season. A slight adze mark on a certain portion of each tie selected for renewal, having the adze marks uniformly at one end of all ties, serves well and need not be of such extent as to damage any ties which a later or more rigid inspection might decide to be serviceable for another season. An old and rather bad practice of examining ties for renewal consisted in the foreman sinking a pick deep into them and mutilating them so that quick decay would result. Ties must be carefully distributed along the track, with a view of saving expense that might be incurred later in handling long distances with a push car.

Where local conditions justify, I prefer to renew ties in stone ballast while giving the track a light general surfacing, making a lift of from one to two inches. The organization of a gang for this work depends on the number of men employed, the extent of the renewals and the density of traffic. The ties are distributed with a push car, unless they have been unloaded directly from a train along the track. I then employ a gang of from 10 to 16 men working under ordinary conditions where the renewals are not excessive. A part of this gang lifts the track, using two jacks, and tamping the good ties immediately. At the same time the remainder of the gang replaces the poor ties with new ones, also tamping them at once.

When the track is raised an inch or two, less labor is required to excavate ballast alongside and under the ties, while the general riding condition of the track is benefited through the new ties having substantially the same bearing as the sound ties that have been left in service.

To make tie renewals where track in stone ballast is not being raised, I prefer to distribute the ties and have the force organized so that one man with a claw bar pulls the spikes from the marked ties, except when a number of poor ties are bunched, when sufficient spikes are left to keep the track safe; one or more men with shovels and chopping axes remove the ballast from both sides of the ties just inside of the rails, and then chop off the tie to be removed so it can be taken out without making any side excavation. After the removal of the old tie, sufficient ballast may be shoveled aside to permit the new ties being pulled to place, but care must be taken to avoid digging too deep, which always results in having loose ties for some time after. The new tie should be carefully tamped and a portion of the ballast replaced, leaving the ends of the tie and a space near the rails only partially filled so that the tie may again be tamped a few days later if found loose, which is quite often the case. I believe the plan of chopping out the old tie is more economical than the tedious and expensive method of excavating the ballast alongside of it and digging a trench to knock it into for removal from under the rails.

The use of tie tongs should be insisted upon in all handling of new ties. New ties should be spiked to proper gage. Before tamping them they must be adzed so that the rails or tie plates have proper bearing. In replacing ballast, forks should be used and no dirty material placed around the new ties. Old ties must be gathered up daily and disposed of as directed.

In renewing ties in earth-ballasted track the following plan is recommended: The gang should be paired off and each pair provided with a claw bar, pick, raising bar or chisel pointed bar (unless the claw bar has a chisel end), shovels and two hard wood blocks tapering from a point to a thickness of about 3 in.

and from 2 to 3 in. wide. To remove the old tie have the dirt dug away from on top of and about half way down the sides by one man, while the other pulls the spikes from the tie to be removed and starts them up on a sound tie on each side. Raise the rails and insert one of the blocks under each rail a sufficient distance to permit the decayed tie being removed without fouling the rails. The height necessary to raise the rails will depend on the kind of dirt and the extent to which the rails may have cut into softwood or unplated ties. After removing the old tie the bed should be prepared for the new one, removing only enough dirt from the old bed to permit the new tie being placed and left "stiff," holding the rail a little high until a few trains pass and settle it.

The height at which the track may be held on the new tie must be governed by the kind of soil in the roadbed and its condition at the time. The force of men usually employed on earth ballasted lines being few, foremen have an opportunity to watch the work closely, and with their knowledge of local conditions they can usually lay new ties so that they will bed themselves to a good bearing under the rails.

Where the old bed is not disturbed and the new tie placed thereon, without any loose material being used under it, care must be taken not to leave the rails too high, as the new tie will settle but little if placed on the old "crust." With this method of raising rails in making tie renewals the track is quite often pulled out of line and after spiking the track it should be lined where necessary.

PROPER SUPERVISION OF TIE RENEWALS

By A. W. Tabert

Roadmaster, Chicago & North Western, Allis, Wis.

Now that the section forces are largely engaged in renewing ties, it is worthy to note that there is no more fruitful field of economy in maintenance expenditure than in the renewal of ties, as this is the largest single item in the cost in track maintenance other than labor. It is apparently more neglected than any other item largely because it requires constant and immediate supervision to prevent the renewals of good ties.

It is natural that if the choice of ties for renewal is left to the foreman he will use all he can get, unless it is made to his interest to save them. Thus, ties are frequently taken out of the track which would have given several more years' service. After removing them it is too late to tell by inspection whether or not they should have been left in track, as they are generally split and otherwise injured in removing them. A certain section foreman who was replacing a string of perfectly good ties with new ones, replied to the question why he was taking out good ties: "I had plenty of new ones on hand and I wanted to get rid of them as soon as possible." This is the attitude of many section foremen. The difficulty of obtaining a sufficient number of ties in certain seasons makes the men put in all they can when ties are plentiful.

Under no circumstances should badly decayed or broken ties be left in the track for this is not true economy. When it becomes necessary to renew a large percentage of ties in any one season it is usually because they have been neglected. As "a stitch in time saves nine," so a tie in time may save others. For instance, we take out switch ties on a busy lead which are spiked-killed, rail-cut, etc. These ties can be used by turning them over and putting them in on some track where there is not so much switching. Also the ties that are taken out of side-tracks, such as "big old cedars," can be turned over and used at the tail ends of spurs or "lazy" tracks that are not used very often, and then merely for storing cars. There are various side-tracks, especially stub end sidings, storage tracks, car-repair tracks, freight-house tracks or industry tracks that are infrequently used for the movement of locomotives but quite generally for standing cars. In such cases a great many second-hand ties which must necessarily come out of a main line may be used to advantage. A roadmaster should without fail watch this feature closely enough to be sure that he is getting the maximum efficiency in the use of track ties.

If we get interested in this we can save our company money on ties. When we realize that it takes approximately 150,000,000 ties per year we can appreciate the immense expenditure involved. Any reduction that can consistently be made in the tie renewal item for either side or main track ought to have our personal attention.

The usual manner of putting in ties is to employ three or more men. When the tie is put into the track in its proper position one man measures it before it is spiked, with a mark made previously on the handle of his spike maul or pick to see if the end is the proper distance from the rail. It usually is not. The other men then stand idle waiting for the first man to place it in the proper location. When the spiking gang comes along the men will again measure the tie from the end to be sure it is the correct distance from the rail as frequently the ties are moved before they are spiked. Assuming that he and his two assistants find the tie distance correct, they have lost from one to two minutes.

To overcome all this delay let the foreman make a mark with chalk, measuring from the end of the tie to the line where the outside base of the rail will come. In this way the tie can be placed in the proper position by the first men, and the spikers will see that it is in the proper place as the chalk mark will still be there. Another method which I have used in spacing ties when track is being surfaced is to have one man put a chalk mark on the base of the rail commencing at the first bolt in the joint and measuring off 21 in. along the entire rail to give the center of the tie. Then one or two men can go along with the lining bars and locate the ties at the chalk marks.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since March 12, 1915:

Canadian Pacific Terminal Improvements at Vancouver.—The construction of a new passenger station and a pier for coast steamers recently completed by the Canadian Pacific at Vancouver, was described and illustrated in the issue of March 19, page 614.

Notable Structures on the Spokane-Ayer Cut-Off.—The interesting features of the Spokane river bridge, the Snake river viaduct and the Hangman creek viaduct on the O.-W. R. & N. line entering Spokane, were described and illustrated in the issue of March 19, page 623.

The Railways and the Steel Companies.—An editorial commenting on the purchase of rails by the Illinois Central and other roads from the Algoma Steel Company at a lower price and to higher specifications than could be secured from mills in this country, was published in the issue of March 26, page 682.

Rock Island Track Elevation Work at Chicago.—The progress made during the first year's work in elevating certain sections of the Rock Island's line in the city of Chicago involving unusually high retaining walls, a complicated three-level structure at the crossing with the Western Indiana, a novel suburban station and other interesting features, was described in the issue of March 26, page 690.

New Line from Lewistown, Mont., to Great Falls.—The Chicago, Milwaukee & St. Paul has completed a 138-mile line providing an entrance into Great Falls and opening up a large agricultural district. The construction details of this work were described in an illustrated article in the issue of April 2, page 734, and in an editorial in the same issue, page 728, the recent tendencies in the use of concrete ballasted deck construction for long bridges was discussed, as illustrated by the practice on the long viaducts built on the Milwaukee's new line.

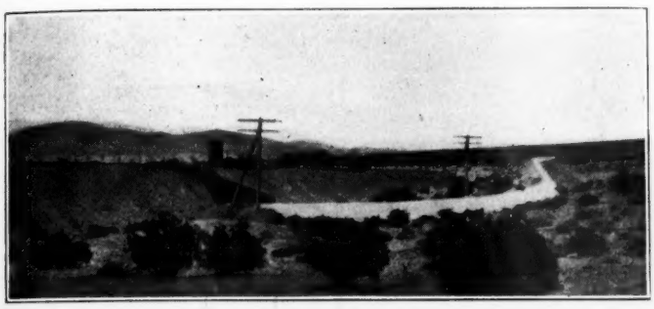
Reconstruction of the Jersey City Terminal Yards.—The important yard changes and the installation of an electro-pneumatic interlocking system in the Jersey City terminal of the Central Railroad of New Jersey which were completed on March 20, were described in the issue of April 9, page 787.

Rolling Resistance of Cars Over Switches and Frogs.—A discussion of the results of tests made to determine the actual resistance of modern cars in passing over switches and frogs in a hump yard as abstracted from a paper by C. L. Eddy, assistant professor of railway engineering, Case School of Applied Science, Cleveland, Ohio, in a bulletin of the A. R. E. A., was published in the issue of April 9, page 796.

Concrete Work on the Arizona Division of the Santa Fe

This Material Is Being Used in the Construction of Bank Protection, Bunk Houses, Bridges, Sign Posts, Etc.

The Arizona division of the Santa Fe, extending from Seligman, Ariz., to Mojave, Cal., and including four branch lines, presents some maintenance problems which have been handled in a manner which it is thought will be of general interest to those who have to do with concrete. This division ranges in altitude from less than 500 ft. to over 5,600 ft. elevation, with like variations in climate. All of it is desert country subject to violent rain storms, commonly referred to



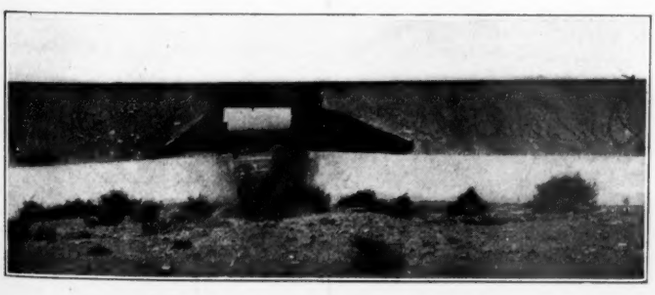
A Blanket Protection Wall Some Distance from the Track

as cloudbursts, in the summer time. The roadbed is constructed for the most part of sand and gravel, which disintegrates readily under the action of water.

The extensive use of concrete on the division had its beginnings in trying to meet these conditions, but owing to certain favorable as well as unfavorable conditions and also to the personnel of the division forces one thing has led to another until the pile driver is nearly obsolete, and concrete brakeshoe boxes, crossing, yard-limit and other signs are being tried out, while a section laborer's concrete bunk house has been made standard.

BANK PROTECTION WALLS

To handle storm water a system of "A" surface ditches was constructed years ago reaching out from a bridge to an apex



Wing Walls Extending Out from a Bridge Opening

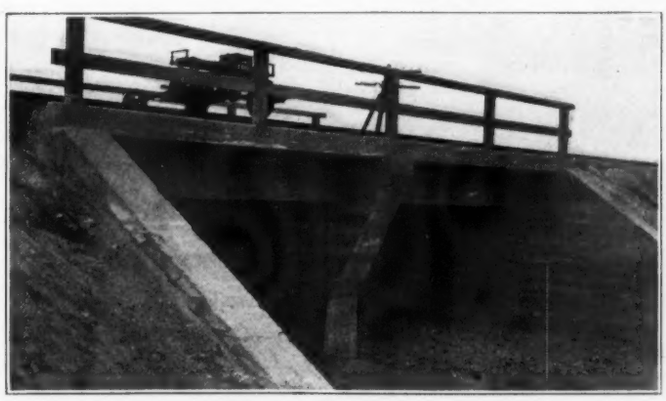
and coming back to the next bridge. There are miles of these ditches costing many thousands of dollars. The statement is probably not far from true that on one branch line there is as much yardage in the ditches as in the road bed they protect. Some of them where the soil contains clay are good yet, but others have been known to give way in one violent storm and many have been rebuilt from one to several times.

About two years ago it became necessary either to rebuild the ditches protecting about 14 miles of roadbed especially subject to washouts, or to adopt some other form of protection, and it was decided to try out on a large scale what had already been done on a small scale in the immediate vicinity of the bridges, viz., line the roadbed with a concrete blanket on the slope of the embankment. Eventually about 25 miles of line was so protected at a cost less than would have been required to restore the ditches, and it looks as though washout troubles have been practically eliminated on this territory and that repairs should be nil, barring accidents. The method of construction as well as the finished wall is well shown in the accompanying photographs.

Where the wash is likely to scour, the blanket is carried down to the bottom on a 1½ to 1 slope. This involves a great deal of grading. Where the wash does not scour, the slope wall is carried a foot or so below the bed of the wash

New Type of Concrete Pier and Slab Construction

and turned straight down in the form of a toe wall, as narrow as can be dug. On this division a toe wall can usually be dug from 14 to 18 in. wide. On a great deal of this territory the material which comes out of the trench is put back in the form of concrete. Therefore, it is cheaper to fill the trench with concrete than to build forms. However, a sheet of metal is dropped into the trench where it is too wide, and



Concrete Slab Opening With a Concrete Hand Rail

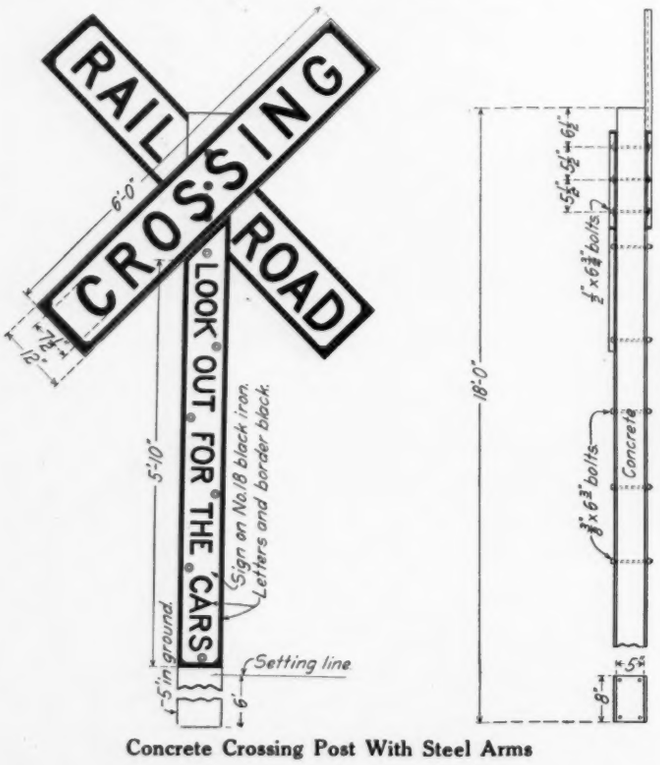
blocked against the side, answering the purpose of a form and keeping the wall the desired width.

Above the toe wall, the bank is sloped off on a 1½ to 1 angle with shovels. A 2-in. by 6-in. piece secured to stakes driven in the ground is laid along the top of the slope, defining the upper limit of the wall. Wire mesh is laid on the

slope and tied to mesh embedded in the toe wall. Parting strips, about 4 ft. apart, are then run down the slope from the 2 by 6 timber at the top to define the slope and skid against. No other forms are used.

The concrete is applied with shovels and skidded off against the parting strips. The greatest care should be taken to see that the mesh is pulled up and kept uniformly in the middle of the concrete. At the head banks of bridges and where water strikes it hard the blanket is made 6 in. thick. Where it is to encounter a rather gentle side wash the thickness is reduced to 4 in. or less.

Figures are not now available showing the cost of all of this work, but one stretch of 8.67 miles cost, per sq. ft., for labor $0.077 and for material $0.038, a total of $0.115. Another stretch of 1.75 miles cost for labor $0.062 and for material $0.031, a total of $0.093 per sq. ft. These had toe walls and no gravel or crushed rock was hauled in. The weather only was unfavorable, being very hot. Another stretch of about 0.75 mile, which was out in the country and not built against the roadbed, cost for labor $0.09 and for material $0.034, a total of $0.124 per sq. ft., the weather and the distance from the track being unfavorable and gravel being obtained on the spot. A wall 400 ft. long, sloped to the bottom, built about 1,500 ft. from the track, cost for labor $0.156 and for material $0.045, or a total of $0.201 per sq. ft. It is expected that many



Concrete Crossing Post With Steel Arms

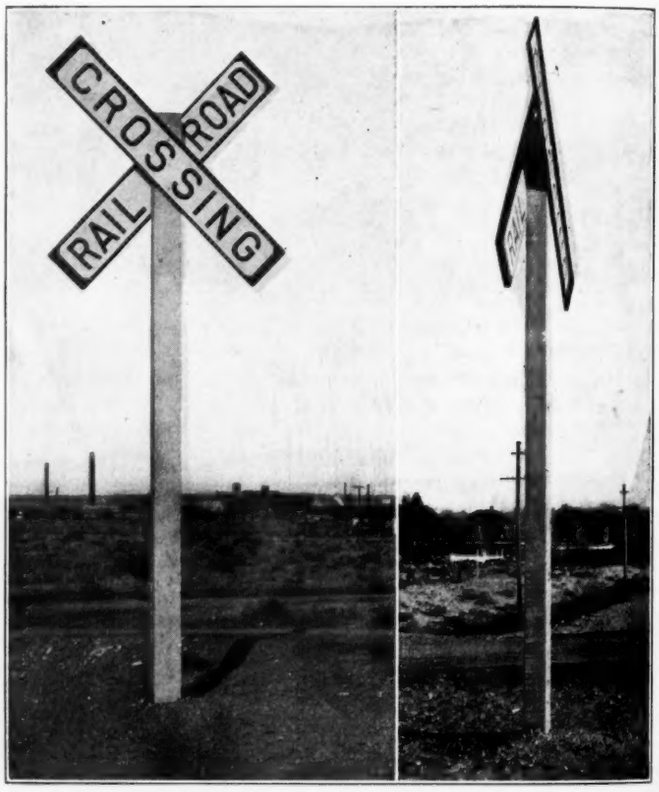
more miles on this division will be protected in like manner in the future.

BRIDGES

In 1913 a 112-ft. reinforced concrete slab deck bridge was built under the main line and a siding at Klondike, Cal., from plans furnished by the bridge engineer. The bridge has seven 16-ft. spans. The plans, which were new designs, were general plans and did not contemplate a sidewalk and hand rail. In this particular instance it developed that a sidewalk and hand rail were necessary and these were added by making slight change in these plans. The ends of the piers were bracketed near the top, and this bracket was increased sufficiently to support the ends of the sidewalk slabs. The guard rail was abolished, the sidewalk serving that purpose, and the inner edge of the sidewalk slab was supported for its entire length on the outer edge of the deck slabs. In the case of this particular bridge an angle iron was used for a hand rail, the uprights being embedded in the ends of the piers and intermediate uprights being bolted by eye-bolts to the reinforcing of the sidewalk slabs. The iron was afterward painted the color of concrete and sanded. Crushed rock was used in the deck and sidewalk slabs and in the upper 3 ft. of the piers. The balance of the piers was made from gravel taken out of the excavation.

The slabs were cast at the site of the work and were put in place with a wrecker, U-bolts being provided for this purpose in the reinforcing. The photographs show construction of the bridge and the way the slabs were handled. The bridge cost $30.87 per running foot.

Another type of bridge that has been used in late construction more than any other on this division has a standard



The Concrete Crossing Post With Metal Cross Arms

creosoted ballast deck on concrete piers. This type of bridge is peculiarly suitable for this territory and is the result of the special conditions prevailing. The violent rains and the soluble nature of the soil render frame bents impracticable. Hard material, including gypsum, hard pan, cemented gravel, or heavy boulders, make it impossible to secure sufficient penetration of piles without digging holes or trenches to set them in, with the result that it is nearly, and in some cases wholly, as cheap to build concrete piers of the material at hand as it is to set piles. Material for the deck and the piers is always in stock, available on short notice, no special plans or supervision are necessary and there is no waiting for steel to be delivered. The creosoted timbers on the concrete last so many years that such a structure is practically a permanent water way. The piers are made strong enough so that when the deck does eventually wear out, steel, or even slab decks, may be substituted, if desired.

SIGNS

Experiments are also being made with concrete and metal signs. These signs are purely experimental as yet, but the results so far indicate that wooden signs cannot compete with concrete and metal, if the latter can be made in quantities by machinery. So far they have been made by hand.

One of the most practical results obtained with this type of sign, and one which might escape notice, is that anyone, say, the section foreman, can detach the metal bearing legend in a moment, attach a fresh one and ship the old one to the shop to be repainted. The large saving in this feature alone, over the prevailing method of sending a painter over the road on a speeder, needs only to be mentioned to be appreciated. This and the tendency hunters have for shooting holes in signs are the considerations that led to abandoning the idea of making them wholly of concrete. In climates where metal corrodes too readily wood may be substituted for the metal parts which bear the legend.

The following is a table showing the cost of these signs made by hand as compared with the store department price of wooden signs:

Kind of sign	Number made	Cost at Needles	Store department prices		
			Topeka	Cleburne	San Bernardino
Highway crossing	12	$3.72	$4.81	$4.75	.....
Station sign	18	1.90	1.62	1.72	$1.17
Yard Limit sign, tentative Y shape	4	2.73	2.32	.....	.....
Whistling sign	18	1.90	1.63	1.60	.94
Section limit board	14 posts 28 signs	.75	.....	.80	.68
Station name board	3	4.45	.....	.....	.....
Rail rests	12	.50	.....	.....	.....

Signs made in Topeka, Cleburne and San Bernardino carrying overhead shop charges, while those at Needles do not.

BRAKEHOSE CELLARS

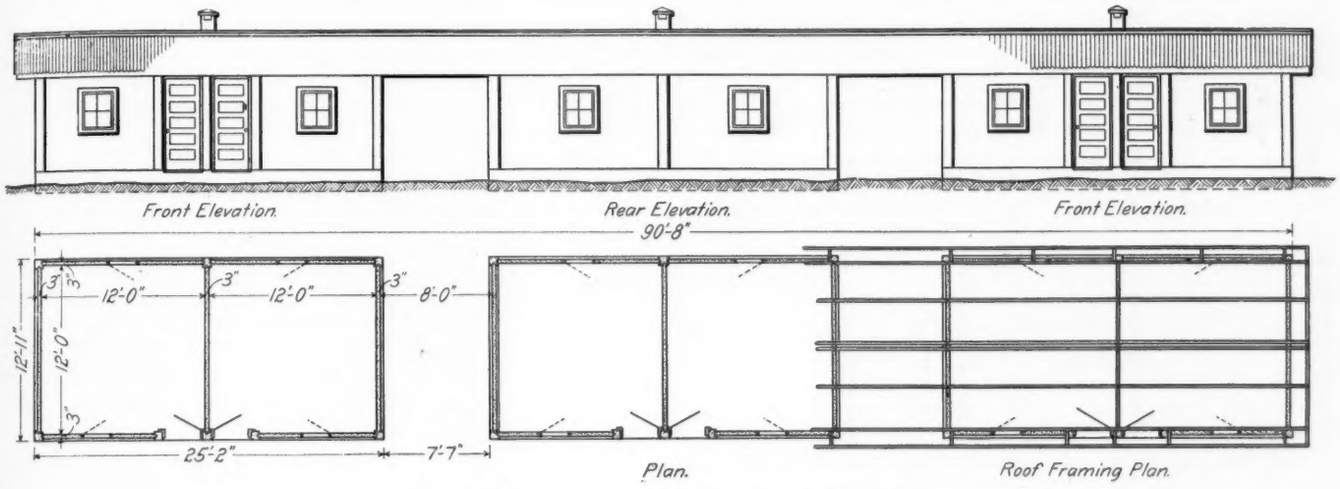
The campaign for "Safety First" led to the design of concrete cellars for brakehose and air valves in the train yards and many of them have been installed in the terminals at Needles and Barstow from plans shown herewith. The cover of the cellar is of metal, flush with the surface of the ground, and eliminates what has heretofore been a considerable hazard. These boxes were made at Needles at a cost of $1.98 each, and were then shipped to points where needed.

Standard Concrete Bunk House

REINFORCED CONCRETE BUNK HOUSE

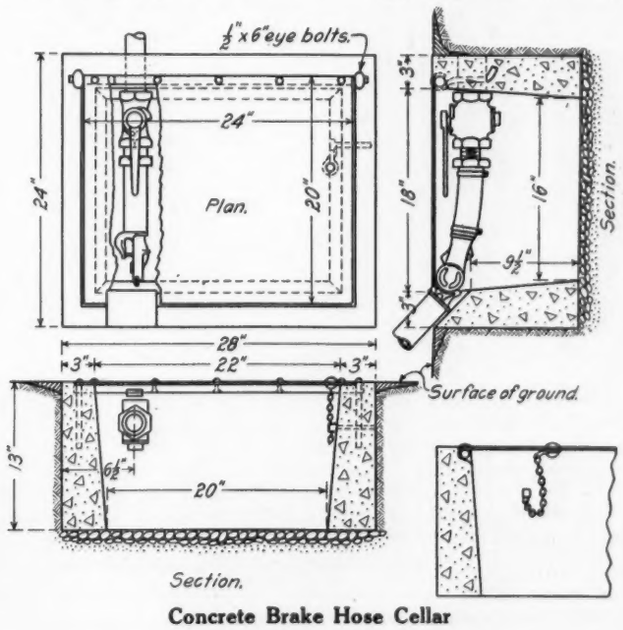
Perhaps the most striking and satisfactory result so far, of the use of concrete, is the house for section laborers. The section laborers on this division are Mexicans and their bunk houses have heretofore been built of ties with oiled dirt roofs. For this class of labor it became highly desirable, if not necessary, to provide some form of habitation which could not be burned down and which would provide more sanitary living quarters.

The conditions mentioned at the beginning pointed to concrete construction as being the solution and, with generous backing on the part of the management, experiments have been carried on until such satisfactory results have been achieved, both as to meeting the needs and as to cost, that this type of house has been adopted as standard on the Coast Lines.



Plan and Elevation of Standard Concrete Bunk House

The first two houses were built by the unit system, the side, end and roof slabs being poured one on top of the other with building paper between. This required very little form work and made cheap construction, but had some undesirable features. It was difficult to ship the thin slabs, and to load, unload and set them up without breaking them. For the first house, at Needles, the slabs were poured at the site of the house. The second was poured at Needles, shipped 130 miles and set up. These cost $645.06 and $654.38, respectively.



Concrete Brake Hose Cellar

The next two were built on the unit system except that it had been decided that concrete was not the proper material for the roof and corrugated asbestos was substituted. These houses cost $612.39 each. The present method is to cast the pilasters in units and, after setting them up similar to the way that studding is set up for a frame house, the walls are poured. The roof is made of galvanized corrugated iron and is ceiled with Schumacher's wall board, a practically fireproof composition.

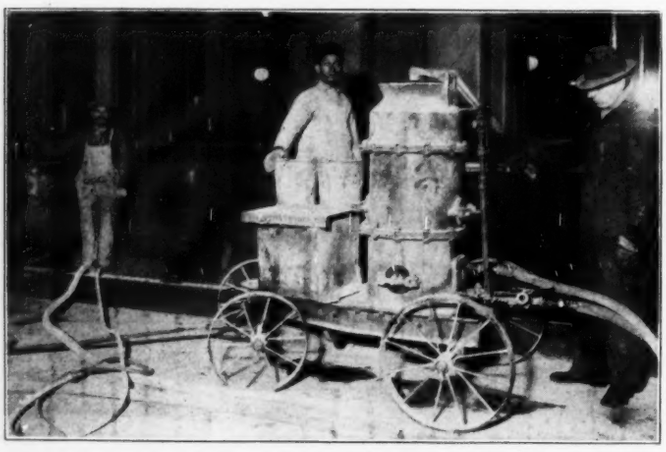
Thirteen houses have been constructed on the division and more are under construction. Four typical houses, the construction of what is thought to be the ultimate design, cost an average of $664.54, all the costs quoted being without freight or rental charges.

Two pump houses have been constructed along the same lines as the bunk houses, but the cost figures are not available.

These various uses of concrete have been developed under the general direction of W. H. Oliver, assistant engineer, and J. W. Wood, general foreman of bridges, of the Atchison, Topeka & Santa Fe, Needles, Cal.

PREVENTING CORROSION OF STEEL UNDER SEVERE CONDITIONS

The steel substructure of the Cortlandt street ferry terminal of the Pennsylvania in New York City was recently coated with a thin layer of cement and sand applied with a cement gun, to protect it from rust. This work is unusual in that the steel work is subjected to exceptionally severe conditions and no reinforcement was used in the Gunite. The first floor of this ferry terminal consists of a steel frame work with wooden floor beams and floor. The steel was given a coat of linseed oil paint before shipping, and after erection was cleaned with wire brushes and given two additional coats of a standard paint. It is about 4 ft. above high water, which at this point is very salty, and in addition, the steel is exposed to large quantities of steam which escape from the drip and drain pipes through the bulkhead wall at low tide. The surface of the steel is therefore wet at all times.



Cement Gun and Two Kelley Sand Blast Machines at Work in Cortlandt Street Ferry Terminal, New York

The paint which was first applied soon came off; the steel was again cleaned and asphaltum applied, but after about six months this could be dusted off with a broom. After this nothing was done for three years, when it was found that some action was necessary, as a coating of scale and rust had formed which could be pulled off in layers 3/32 in. thick. In consultation with the Cement Gun Company, Inc., New York, the proposal was made that the steel be covered with a wire mesh reinforcing, and Gunite be applied over this to a thickness of 1½ in. This proposal proved to be too expensive, however, as the placing of the reinforcement on the 220 steel girders and numerous tie beams was made very difficult by the layout of the wooden floor beams, and the thickness of Gunite would have been greater than that needed for the protection of the steel.

The question of coating steel without reinforcement was then taken up, and an exhaustive preliminary test made to see whether such an application of Gunite would be practical and satisfactory. It was found that the design of the steel work provided amply for the additional load, so that the ability of the Gunite to withstand the conditions existing was the only point to be determined. A piece of 4-in. by 4-in. angle 2 ft. long was sand-blasted to the gray metal and left with a smooth surface. As the steel work under the building was very badly pitted by corrosion it was evident that, after cleaning, the surface would be rougher than the test sample and would, therefore, afford a better bonding surface.

About one hour after the sample was cleaned, it was coated with a 1:3 mixture of cement and sand applied with a cement gun to a thickness of from ¼ in. to ½ in. The sample was then stored in moist salt air for three days, then submerged in salt water from the river for three days, then carried into a cold storage house nearby in the pan containing the salt water and the sample. Here the sample was taken out, placed in a clean, dry, wooden box on a sheet of white paper and stored at an even temperature of 5 deg. below zero for 48 hours. At the end of that time no cement had flaked off, and as it was coated with ice it was taken into a warm room and allowed to thaw out over night. In the morning no flaking had occurred and the sample was then placed on top of the boiler in a power house, where the temperature was 110 deg. F. It was left for three days, after which a microscopic examination showed it to be intact. No hair cracks were visible and no cement had flaked off. After it had cooled it was given a 2-ft. drop on a wooden floor and then on a concrete floor. Another microscopic examination failed to reveal cracks or checks, so to find out whether the water had penetrated the coating the sample was given a 10-ft. drop on a concrete floor, which broke the coating from the outside of the angle but not from the inside. There were no signs of corrosion, the neat cement bond and the glazed cement finish being evident.

As a result of the satisfactory nature of this test two sand-blast machines and a cement gun were put to work on the terminal. All the steel was first sand-blasted to the gray metal and then coated with Gunite to a thickness of ¼ in. to ½ in. The work was started early in October, 1914, and completed in January, 1915. An examination of the work after four months showed no signs of cracking and gave every indication of a strong bond.

The Pennsylvania has recently purchased a cement gun equipment to repair concrete-protected overhead steel bridges on which the concrete has been cut away by the action of locomotive blasts. This purchase was made after a two years' test of steel protected with Gunite under severe conditions, the test beams being located in the West Philadelphia station, directly over the point where many locomotives stop. There is quite a grade at this point, and on starting, the locomotives subject the beams to the full force of the blast. No erosion or disintegration of the Gunite coating has occurred since this test was inaugurated.

SUPREME COURT AND THE POST OFFICE DEPARTMENT.—It is a pity, perhaps, that the principle of rate fixing by public service commissions recently enunciated by the United States Supreme Court, cannot be applied with equal rigor to the government's own enterprises. A state cannot compel a railroad to transport either passengers or particular commodities, says the court, at rates which do not yield reasonable compensation. If the post office department were managed on that principle, second-class mail matter and rural delivery service would have to pay postal rates sufficient to wipe out the heavy deficits which they now are responsible for each year.—*Springfield Republican.*

American Railway Engineering Association Committees

A Complete List of Names of Members Appointed and Subjects Specified for Investigation and Report

The Board of Direction of the American Railway Engineering Association has selected the personnel of the new committees and the subjects for investigation and report during the coming year as follows:

Committee I—Roadway

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of unit pressures allowable on roadbed of different materials, co-operating with Special Committee on Stresses in Railroad Track.
3. Report on the prevention and cure of water pockets in roadbed.

W. M. Dawley (chairman), Erie; J. A. Spielmann (vice-chairman), B. & O.; J. R. W. Ambrose, G. T.; A. F. Blaess, I. C.; S. P. Brown, C. N.; B. M. Cheney, C. B. & Q.; Ward Crosby, C. C. & O.; W. C. Curd, M. P.; Paul Didier, B. & O.; S. B. Fisher, M. K. & T.; Frank Merritt, G. C. & S. F.; L. G. Morphy, B. & A.; F. M. Patterson, I. C. C.; W. D. Pence, I. C. C.; W. H. Petersen, C. R. I. & P.; A. C. Prime; H. J. Slifer; J. E. Willoughby, A. C. L.; W. P. Wiltsee, N. & W.

Committee II—Ballast

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on the economical and efficient depth of ballast, co-operating with Special Committee on Stresses in Railroad Track.
3. Methods and cost of applying ballast—
   (a) Ballasting by contract.
   (b) Mechanical tamping and shoulder formings.
4. Efficiency of various stone and gravel ballasts.

H. E. Hale (chairman), President's Conference Committee on Valuation; J. M. Meade (vice-chairman), A. T. & S. F.; L. W. Baldwin, I. C.; D. P. Beach, P. L. W.; W. J. Bergen, N. Y. C. & S. L.; Carl Bucholtz, Erie; T. C. Burpee; O. H. Crittenden, I. & G. N.; J. M. Egan, I. C.; T. W. Fatherson, C. G. W.; H. L. Gordon, B. & O.; G. H. Harris, M. C.; C. C. Hill, M. C.; S. A. Jordan, B. & O.; William McNab, G. T.; S. B. Rice, R. F. & P.; E. V. Smith, B. & O.; D. L. Sommerville, N. Y. C.; F. J. Stimson, G. R. & I.; D. W. Thrower, I. C.; R. C. White, M. P.

Committee III—Ties

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on the effect of tie plates and track spikes on life of cross-ties.
3. Specifications for cross and switch-ties.
4. Metal, composite and concrete ties.

L. A. Downs (chairman), I. C.; F. R. Layng (vice-chairman), B. & L. E.; C. C. Albright, Purdue University; M. S. Blaiklock, G. T.; W. J. Burton, M. P.; W. A. Clark, D. & I. R.; S. B. Clement, T. & N. O.; E. D. Jackson, B. & O.; E. P. Laird, A. C. L.; E. R. Lewis, D. S. S. & A.; J. B. Myers, B. & O.; A. J. Neafie, D. L. & W.; J. V. Neubert, N. Y. C.; R. J. Parker, A. T. & S. F.; J. G. Shillinger, Rutland; I. O. Walker, N. C. & S. L.; H. S. Wilgus, P. S. & N.; Louis Yager, N. P.

Committee IV—Rail

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on rail failures, statistics and conclusions.
3. Report on effect on rail of defective equipment and improper maintenance.
4. Continue special investigation of rails.
5. Track bolts and nutlocks.

J. A. Atwood (chairman), P. & L. E.; R. Montfort (vice-chairman), L. & N.; W. C. Cushing, P. L.; E. B. Ashby, L. V.; A. S. Baldwin, I. C.; Chas. S. Churchill, N. & W.; J. B. Berry; G. M. Davidson, C. & N. W.; Dr. P. H. Dudley, N. Y. C.; C. F. W. Felt, A. T. & S. F.; L. C. Fritch, C. N.; A. W. Gibbs, P. R. R.; C. W. Huntington, M. & S. L.; John D. Isaacs, S. P.; Howard G. Kelley, G. T.; C. F. Loweth, C. M. & S. P.; H. B. MacFarland, A. T. & S. F.; C. A. Morse, C. R. I. & P.; J. R. Onderdonk, B. & O.; J. P. Snow; F. S. Stevens, P. & R.; A. W. Thompson, B. & O.; R. Trimble, P. L.; Geo. W. Vaughan, N. Y. C.; M. H. Wickhorst.

Committee V—Track

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of Economics of Track Labor.
3. Study the relation between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to the combination of worn switch points and worn flanges on wheels.
4. Present specifications and designs for cut- and screw-spikes.
5. Report on guard rails and flangeways and effect of increase of ⅛-inch thickness of wheel flanges.

J. B. Jenkins (chairman), B. & O.; G. J. Ray (vice-chairman), D. L. & W.; Geo. H. Bremner, I. C. C.; J. F. Burns, L. & N.; H. M. Church, B. & O.; Garrett Davis, C. R. I. & P.; J. M. R. Fairbairn, C. P.; T. H. Hickey, M. C.; E. T. Howson, *Railway Age Gazette;* L. J. F. Hughes, C. R. I. & P.; E. L. Ingram, University of Pennsylvania; T. T. Irving, G. T.; J. R. Leighty, M. P.; H. A. Lloyd, Erie; A. C. Mackenzie, C. P.; P. C. Newbegin, B. & A.; F. B. Oren, I. C.; R. M. Pearce, P. & L. E.; H. T. Porter, B. & L. E.; E. Raymond, A. T. & S. F.; W. G. Raymond, State University of Iowa; L. S. Rose, C. C. C. & S. L.; H. R. Safford, G. T.; C. H. Stein, C. R. R. of N. J.; A. H. Stone, K. C. T.

Committee VI—Buildings

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on coaling stations.
3. Report on freight house scales.
4. Report on ashpits.

M. A. Long (chairman), B. & O.; G. H. Gilbert (vice-chairman), Q. & C.; G. W. Andrews, B. & O.; J. P. Canty, B. & M.; D. R. Collin, N. Y. C.; W. H. Cookman, P. R. R.; C. G. Delo, C. G. W.; W. T. Dorrance; C. H. Fake, M. R. & B. T.; A. T. Hawk, C. R. I. & P.; P. B. Roberts, G. T.; W. S. Thompson, P. R. R.

Committee VII—Wooden Bridges and Trestles

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of design of docks and wharves.
3. Report on comparative merits of ballast deck and reinforced concrete trestles.
4. Continue the study of the use of lag screws in trestle construction.

E. A. Frink (chairman), S. A. L.; W. H. Hoyt (vice-chairman), D. M. & N.; H. Austill, Jr., M. & O.; J. E. Barrett, L. & H. R.; H. C. Brown, Jr., I. C.; E. A. Hadley, M. P.; F. G. Hoskins, B. & O.; H. S. Jacoby, Cornell University; A. O. Ridgway, D. & R. G.; I. L. Simmons, C. R. I. & P.; D. W. Smith, H. V.; W. F. Steffens, N. Y. C.

Committee VIII—Masonry

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on cost and method of constructing concrete piles.
3. Report of cost, appearance and wearing qualities of surface finish of concrete.
5. Report on design of foundations for piers, abutments, retaining walls and arches in various soils and depth of water (not including pneumatic foundations).

F. E. Schall (chairman), L. V.; F. L. Thompson (vice-chairman), I. C.; R. Armour, G. T.; John C. Blye; H. A. Cassil, B. & O. S. W.; T. L. Condron; J. K. Corner, L. E. & W.; L. J. Hotchkiss; Richard L. Humphrey; W. S. Lacher, C. M. & S. P.; C. P. Richardson, C. R. I. & P.; R. A. Rutledge, A. T. & S. F.; G. H. Scribner, Jr.; F. P. Sisson, G. T.; Job Tuthill; J. J. Yates, C. R. R. of N. J.

Committee IX—Signs, Fences and Crossings

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on principles governing the use of railway signs.
3. Continue the study of concrete fence posts.

W. F. Strouse (chairman), B. & O.; G. E. Boyd (vice-chairman), D. L. & W.; R. B. Abbott, P. & R.; H. E. Billman, M. P.; E. T. Brown, B. & O.; A. C. Copland, C. & O.; Arthur Crumpton, G. T.; J. T. Frame; L. E. Haislip, B. & O.; Maro Johnson, I. C.; L. C. Lawton, A. T. & S. F.; G. L. Moore, L. V.; Thomas Quigley, I. C.; C. H. Splitstone, Erie.

Committee X—Signals and Interlocking

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of economics of labor in signal maintenance.
3. Report on signal installations on single-track roads.
4. Present, for approval, specifications adopted by the Railway Signal Association, which, in the judgment of the Committee, warrant consideration.
5. Requisites for switch indicators, conveying information on condition of the block to conductors and enginemen.

C. C. Anthony (chairman), P. R. R.; J. A. Peabody (vice-chairman), C. & N. W.; Azel Ames; H. S. Balliet, N. Y. C.; C. A. Christofferson, N. P.; C. E. Denney; C. A. Dunham, G. N.; W. J. Eck, Southern; W. H. Elliott, N. Y. C.; G. E. Ellis, K. C. T.; M. H. Hovey; A. S. Ingalls, N. Y. C.; A. M. Keppel, Washington Terminal Company; H. K. Lowry, C. R. I. & P.; J. C. Mock, M. C.; F. P. Patenall, B. & O.; D. W. Richards, N. & W.; A. H. Rudd, P. R. R.; W. B. Scott, Sunset Central Lines; A. G. Shaver; Thos. S. Stevens, A. T. & S. F.; W. M. Vandersluis, I. C.

COMMITTEE XI—RECORDS AND ACCOUNTS

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on the use of small forms on cardboard or other suitable material for use of fieldmen in making daily reports, to the end that supervision may be facilitated and efficiency encouraged.
3. Continue the study of feasible and useful subdivisions of Interstate Commerce Commission classification accounts 202 and 220, with a view to securing uniformity of labor costs, separating the items in accordance with such forms as are promulgated by the I. C. C. during the year.
4. Investigation of methods for reproducing maps and profiles on drawing linen for permanent record.

W. A. Christian (chairman), I. C. C.; M. C. Byers (vice-chairman), W. M.; F. J. Bachelder; W. S. Danes, Wabash; Lester Bernstein, B. & O.; G. D. Hill, I. C.; Huntington Smith, N. Y. C. & S. L.; Henry Lehn, N. Y. C.; J. H. Milburn, B. & O.; J. W. Orrock, C. P.; J. C. Patterson, Erie; H. C. Phillips, A. T. & S. F.; J. H. Reinholdt, M. & St. L.; R. C. Sattley, C. R. I. & P.; Guy Scott, P. L.; H. M. Stout, N. P.; Frank Taylor, C. P.; J. M. Weir, C. R. I. & P.; W. D. Wiggins, P. L. W.; J. H. Prior, Public Utilities Commission of Illinois.

COMMITTEE XII—RULES AND ORGANIZATION

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on clearance for maintenance of way structures under assignment from the Committee on Maintenance of the American Railway Association, conferring with other committees.
3. Continue the formulation of rules for the guidance of field parties.
4. Continue the study of science of organization.

G. D. Brooke (chairman), B. & O.; F. D. Anthony (vice-chairman), D. & H.; R. P. Black, K. & M.; L. L. Beal, A. B. & A.; Ralph Budd, G. N.; J. B. Carothers, B. & O.; S. E. Coombs, N. Y. C.; C. Dougherty, Q. & C.; B. Herman, Southern; A. J. Himes, N. Y. C. & St. L.; Jos. Mullen, C. C. C. & St. L.; E. T. Reisler, L. V.

COMMITTEE XIII—WATER SERVICE

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on cost of pumping water by various methods.
3. Report on protection for water stations against freezing.

A. F. Dorley (chairman), M. P.; J. L. Campbell (vice-chairman), E. P. & S. W.; J. T. Andrews, B. & O.; C. A. Ashbaugh, G. C. & S. F.; F. T. Beckett, C. R. I. & P.; M. C. Blanchard, A. T. & S. F.; C. C. Cook, R. & O.; R. H. Gaines, K. C. S.; W. C. Harvey, C. G. W.; E. G. Lane, B. & O. S. W.; W. A. Parker, St. J. & G. I.; R. W. Willis, C. B. & Q.

COMMITTEE XIV—YARDS AND TERMINALS

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on handling of freight in double-deck freight houses and cost of operation.
3. Continue study of typical situation plans of passenger stations and approaches, and methods of operating same.
4. Continue the study of classification yards.

E. B. Temple (chairman), P. R. R.; B. H. Mann (vice-chairman), M. P.; W. G. Arn, I. C.; H. Baldwin, C. C. C. & St. L.; G. H. Burgess, D. & H.; A. E. Clift, I. C.; L. G. Curtis, B. & O. C. T.; H. T. Douglas, Jr., C. & A.; A. C. Everham, K. C. T.; R. Ferriday, C. C. C. & St. L.; G. H. Herrold; D. B. Johnston, P. L.; H. A. Lane, B. & O.; L. J. McIntyre, N. P.; A. Montzheimer, E. J. & E.; H. J. Pfeifer, T. R. R. A.; W. L. Seddon, S. A. L.; C. H. Spencer, I. C. C.; E. E. R. Tratman, Engineering News; E. P. Weatherly; W. L. Webb, C. M. & St. P.; C. C. Wentworth, N. & W.; J. G. Wishart, C. R. I. & P.

COMMITTEE XV—IRON AND STEEL STRUCTURES

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of methods of protection of iron and steel structures against corrosion.
3. Continue the study of the relative economy of various types of movable bridges.
4. Continue the study on secondary stresses and impact.
5. Continue the study of column tests.

A. J. Himes (chairman), N. Y. C. & St. L.; O. E. Selby (vice-chairman), C. C. C. & St. L.; J. A. Bohland, G. N.; W. S. Bouton, B. & O.; A. W. Buel; A. W. Carpenter, N. Y. C.; Charles Chandler, I. C.; C. L. Crandall, Cornell University; J. E. Crawford, N. & W.; A. Chas. Irwin, C. M. & St. P.; J. M. Johnson, I. C.; B. R. Leffler, L. S. & M. S.; W. H. Moore, N. Y. N. H. & H.; P. B. Motley, C. P.; Albert Reichmann, American Bridge Company; J. W. Reid, C. & A.; A. F. Robinson, A. T. & S. F.; H. B. Seaman; C. E. Smith, M. P.; H. B. Stuart, G. T.; G. E. Tebbetts, K. C. T.; F. E. Turneaure, University of Wisconsin; L. F. Van Hagan, University of Wisconsin.

COMMITTEE XVI—ECONOMICS OF RAILWAY LOCATION

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Establish a rational basis for determining the relative efficiency of various locations.
3. Report on effect of curvature on cost of maintenance of way and equipment.
4. Report on train resistance at speeds exceeding 35 miles per hour.
5. Report on fuel consumption per horsepower hour.

John G. Sullivan (chairman), C. P.; C. P. Howard (vice-chairman); F. H. Alfred, P. M.; R. N. Begien, B. & O. S. W.; Willard Beahan, L. S. & M. S.; D. F. Crawford, P. L. W.; Maurice Coburn, Vandalia; A. C. Dennis; R. D. Gardner, S. N. E.; A. S. Going, G. T.; F. W. Green, Louisiana & Arkansas; P. M. LaBach, C. R. I. & P.; Fred Lavis; J. de N. Macomb, Jr., A. T. & S. F.; C. W. P. Ramsey, C. P.; S. S. Roberts; E. C. Schmidt, University of Illinois; A. K. Shurtleff, Engineering Committee of the President's Conference; H. J. Simmons, E. P. & S. W.; H. R. Talcott, B. & O.; L. L. Tallyn, D. L. & W.; Walter Loring Webb; H. C. Williams, L. & N.; M. A. Zook, I. C. C.

COMMITTEE XVII—WOOD PRESERVATION

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of the effect of water in creosote.
3. Continue the study of the relation of amount of preservative and depth of penetration to the resistance of materials against decay, and also the penetration of preservatives.
4. Continue the compilation of service test records.
5. Report on drying process of wood preservation.

Earl Stimson (chairman), B. & O.; E. H. Bowser (vice-chairman), I. C.; F. J. Angier, B. & O.; W. A. Fisher, A. C. L.; C. F. Ford, C. R. I. & P.; Dr. W. K. Hatt, Purdue University; V. K. Hendricks, St. L. & S. F.; George E. Rex, A. T. & S. F.; E. A. Sterling; Lowry Smith, N. P.; C. M. Taylor, C. R. R. of N. J. and P. & R.; C. H. Teesdale, Forest Products Laboratory; T. G. Townsend, S. O.; Dr. Hermann von Schrenk.

COMMITTEE XVIII—ELECTRICITY

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Continue the study of the subject of clearances of third rail and overhead structures, conferring with other committees.
3. Continue the study of electrolysis and insulation and its effect upon reinforced concrete structures.
4. Report on water power for electrical railway operation.
5. Continue the study of maintenance organization with relation to track structures.

George W. Kittredge (chairman), N. Y. C.; J. B. Austin, Jr. (vice-chairman), L. I.; D. J. Brumley, I. C.; R. D. Coombs; A. O. Cunningham, Wabash; Walt Dennis, C. R. I. & P.; R. H. Ford, C. R. I. & P.; George Gibbs, P. R. R.; G. A. Harwood, N. Y. C.; E. B. Katte, N. Y. C.; C. E. Lindsay, N. Y. C.; W. L. Morse, Jacksonville Terminal Company; W. S. Murray; J. A. Peabody, C. & N. W.; Frank Rhea, I. C. C.; J. R. Savage, L. I.; Martin Schreiber, Public Service Railway; H. U. Wallace, Northern Colorado Power Company.

COMMITTEE XIX—CONSERVATION OF NATURAL RESOURCES

1. Continue the study of tree planting and general reforestation.
2. Present specifications for southern yellow pine, conferring with other committees and associations.
3. Continue the study of resources of iron ore, coal, fuel-oil and timber.
4. Report on water power for railway electrical operation.

C. H. Fisk (chairman); William McNab, G. T.; R. H. Aishton, C. & N. W.; Moses Burpee, Bangor & Aroostook; F. F. Busteed, C. P.; A. L. Davis, I. C.; W. A. Hammel; A. L. Moorshead, Erie; Francis Lee Stuart, B. & O.; S. N. Williams, Cornell College; R. C. Young, L. S. & I.

UNIFORM GENERAL CONTRACT FORMS

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on siding agreements.
3. Report on agreement forms for interlocking and railway crossings, conferring with Committee on Signals and Interlocking.

E. H. Lee (chairman), C. & W. I.; C. A. Wilson (vice-chairman); C. Frank Allen, Massachusetts Institute of Technology; W. G. Atwood, I. C. C.; John P. Congdon; Thos. Earle, Pennsylvania Steel Co.; J. C. Irwin, B. & A.; R. G. Kenly, M. & St. L.; C. A. Paquette, C. C. C. & St. L.; J. H. Roach, L. S. & M. S.

GRADING OF LUMBER

1. Make critical examination of the subject matter in the Manual, and submit definite recommendations for changes.
2. Report on grading rules for white and Norway pines.
3. Specifications for southern yellow pine. (A. S. T. M.)
4. Specifications for timber to be treated in co-operation with the Committee on Wood Preservation.

Dr. Hermann von Schrenk (chairman); B. A. Wood (vice-chairman), M. & O.; W. McC. Bond, B. & O.; D. Fairchild, N. P.; W. H. Norris, Maine Central; J. J. Taylor, K. C. S.

STRESSES IN TRACK

A. N. Talbot (chairman), University of Illinois; W. M. Dawley (vice-chairman), Erie; A. S. Baldwin, I. C.; J. B. Berry; G. H. Bremner, I. C. C.; John Brunner, Illinois Steel Co.; W. J. Burton, M. P.; Chas. S. Churchill, N. & W.; W. C. Cushing, P. L.; Dr. P. H. Dudley, N. Y. C.;

H. E. Hale, President's Conference Committee; Robt. W. Hunt; J. B. Jenkins, B. & O.; George W. Kittredge, N. Y. C.; P. M. LaBach, C. R. I. & P.; C. G. E. Larsson, American Bridge Co.; William McNab, G. T.; G. J. Ray, D. L. & W.; Albert Reichmann, American Bridge Co.; Earl Stimson, B. & O.; F. E. Turneaure, University of Wisconsin; J. E. Willoughby, A. C. L.

THE DISTRIBUTION AND CARE OF CROSSTIES*

By E. F. Robinson
Chief Engineer, Buffalo, Rochester & Pittsburgh

The question of the distribution and care of crossties is one of the most important that we have to deal with in track maintenance and one that has been given a great deal of thought and attention by our present engineering organization. We have a timber-preserving plant at Bradford, which was placed in service during the summer of 1910, and since that time practically all cross and switch ties placed in our tracks have been treated with creosote, with the exception of ties renewed in unimportant side tracks.

In outlining our present practice, we considered it necessary to begin at the beginning, that is, with the purchase of the untreated ties. We are very particular in the selection of our ties, both as regards the manufacture and the character of timber, and nothing but first-class material is accepted. With a view of securing uniform treatment and a uniform roadbed, we accept nothing for treatment but sawed ties of uniform dimensions, excepting in some cases where we have been unable to secure sufficient local ties for our supply. We have found it necessary to purchase yellow pine hewn ties from the South, but this applies to a limited extent only. So far we have been able to secure practically all ties locally from points near our line, mostly beech, maple, hickory, red oak and chestnut. After the selection of the ties, we give careful attention to the piling and seasoning before treatment, separating the different classes of timber into groups, as our experience in treating may dictate. I am a firm believer in thoroughness in the treatment of ties, and am strongly of the opinion that in treating some classes of timber to refusal and others with from 10 to 12 lb. of creosote oil per cu. ft., we are working in the right direction, especially in view of the precautions taken in the handling and protection of ties after treatment, details that unfortunately are entirely disregarded on a great many roads.

After the ties are treated they are either piled in the storage yard at our timber-preserving plant, or shipped out along the line, depending upon conditions. Usually in the fall and early spring months, before we wish to distribute ties along the track for renewals, we ship them out from the plant as treated and pile them in standard piles at stations and adjacent to sidetracks where they can be reloaded easily for distribution by the section men. During the summer months the piles are covered with a layer of earth to prevent rapid drying out, but during the winter months they are left uncovered.

We require our men to be very careful in the handling of treated ties; they are not allowed to throw them over the sides of cars on top of each other in piles, neither are they permitted to throw them down embankments promiscuously when distributing for renewals. We require the use of tongs in pulling ties into the track, and absolutely prohibit the use of shovels, picks or any other tools for this purpose. We also prohibit the use of spike mauls or like tools for bucking the ties around in the track.

As sawed ties do not require adzing for tie plates, and as what few hewn ties we treat are adzed at the plant before treatment, it is not necessary for the track men to use an adze on them; but we realize, of course, that in a few years, as the tie plates will settle more or less into the ties, it will be necessary to adze them to some extent when laying new rail or when rolling rail in on curves. Every treated tie that goes into our tracks, both on tangents and curves, is plated with a Goldie shoulder tie plate, size ½ in. x 7 in. x 9 in., and these plates are applied to the ties, using the Ware tie-plate gage and surfacer and beetles, before the ties are placed in the track. Where it is necessary to pull spikes, all holes in treated ties are plugged with creosoted tie plugs, and before driving the plugs in place, hot creosote is poured into the spike holes, the men driving the plugs being provided with goggles to avoid injury to the eyes. Where it becomes necessary to adze treated ties, the cut surfaces immediately receive a brush treatment of hot creosote oil.

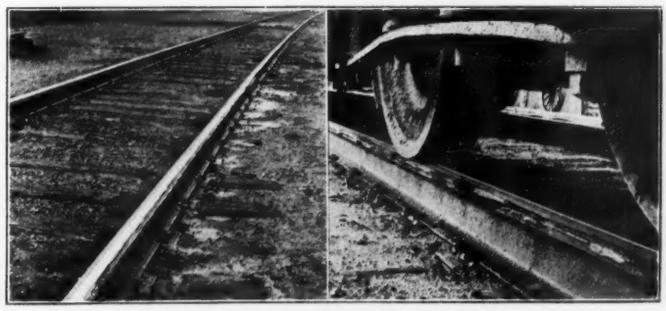
A galvanized nail is applied to the ties at the timber-preserving plant, indicating the class of timber, and when the ties are placed in the track dating nails are applied, showing the year. Section foremen are required to submit a daily report, showing the number of ties of each class placed in the track between each mile post, and a condensed record is kept in this office. In the case of the removal of treated ties from the track from any cause whatever, the foremen are required to report, giving sufficient data as regards location, etc., to enable us to trace out the life of the ties removed.

With the exception of providing our men with goggles to protect the eyes, we have not thought it necessary to adopt any method of protection against poisoning, except to call the attention of our foremen to the necessity of using extreme care in the handling of treated ties, especially in the case of men having skin abrasions or any form of skin disease. When we first commenced using treated ties, we had a large number of cases of poisoning, but this trouble seems to be disappearing as our men become more familiar with the handling of the treated timber.

*Abstracted from Appendix A to the report of the Committee on Ties of the American Railway Engineering Association.

EFFECT OF CANTING THE LOW RAIL ON CURVES

In our issue of August 21, 1914, page 351, we discussed the practice of canting rails and the advantages and disadvantages resulting therefrom. In that article we referred particularly to the detrimental effect of canting the inner or low rail on curves, as this brings the line of contact between the rail and the wheels on the outer edge of the head, causing excessive pressure and flowing of the metal. This condition is strikingly shown by the two accompanying photographs recently taken within a few minutes of each other at the same location. The one on the left shows the condition of a Bessemer rail canted inward slightly on the low side of a 3 deg. 30 min. curve after being in the track eight months. The elevation at this point was 3¼ in. and the gage 4 ft. 9⅛ in. This curve was within station limits near a water tank where many trains stop and the speed was therefore slow. The photograph on the right shows the contact of a car wheel on the outer edge of the rail with light showing between the inner edge of the rail and the wheel tread.



Condition of Low Rail on Curve (on Left) and Condition Causing It (on Right)

A SUCCESSFUL EXAMPLE OF TREE PLANTING*

The catalpa plantation of the Illinois Central at Harahan, La., is located seven miles north of New Orleans, on the main line of the Illinois Central, and consists of 200 acres set apart from land already acquired by the railroad company. The soil is the well known alluvial deposit of the Mississippi river bottom land, of great depth, and having good drainage and sub-irrigation. The planting was made in the spring of 1902, at which time 173,000 one-year seedlings of the Catalpa Speciosa were planted. The trees were planted 4 ft. apart, with the expectation that the close planting would promote a straight growth until such time as the trees had become sufficiently large for fence posts, thinning them out as they became of such size, leaving the trees that were to grow into size for crossties approximately 12 ft. apart.

The handling of the plantation was at first entrusted to outside parties, who, on account of lack of familiarity with the soil and labor conditions, incurred a greater expense, in

View in Illinois Central Catalpa Plantation at Harahan, La.

the first few years, than is now felt to have been necessary, in the cultivation and upkeep of the plantation, although, due to the exceedingly fertile soil, an unusual expense would necessarily be incurred in the first few years in the protection of the seedlings from the rank growth of grass, weeds and underbrush, which had a tendency not only to smother the seedlings, but presented a fire risk in the fall of the year, from which latter cause considerable injury was incurred on several occasions.

When the trees were first planted, it was with the theory that when the catalpa tree is cut back at an age of from three to five years, the sprouts which will spring from the stump will be straight, more hardy and generally better than if the original tree be allowed to mature. Carrying out this theory at Harahan, a considerable number of young trees were cut back, but the few sprouts that grew were inferior to the original plant and showed no superior qualities as to straight growth. While this theory may be applicable to a catalpa tree growing in an isolated position, experience at Harahan plantation proved that when catalpa trees are planted closely together the shadows cast by their tops, together with atmospheric conditions and probably sub-surface influence, produce a different effect, and the stump produces sprouts with short life and very slow growth.

In 1906 the practice of cutting back the young trees was abandoned and the growth having advanced considerably, cattle were allowed to graze throughout the plantation, with the result that the growth of grass and weeds was kept down, danger from fire was eliminated, the trees became sturdy and straightened up well in their growth, and heavy expenditures for upkeep were no longer necessitated. This practice is continued at the present time. While this might not be successful under other conditions, it has given the best results in the particular condition of climate and soil and character of trees at this particular plantation.

At the 1914 convention of the American Railway Engineering Association the Illinois Central exhibited a standard 6 in. by 8 in. by 8 ft. crosstie, and two 6-ft. fence posts cut from a single catalpa tree grown on the plantation in 12 years from the seed, but the tree from which these were cut was one of the largest in the plantation, being probably twice the size of the average tree. It was given as an illustration of the possibilities under the most favorable conditions.

The financial status of the plantation as of June 30, 1914, was as follows:

Cost of 200 acres of land in 1898	$ 1,466.67	
173,000 seedlings	1,346.66	
Preparing land and planting	2,537.96	
Cultivation	3,030.13	
Total first year ending June 30, 1903		$ 8,381.42
Cultivation, 1904		4,805.25
Cultivation, 1905		1,643.76
Cultivation, 1906		2,334.65
Fencing and fire protection, 1907		525.40
Cultivation and thinning, 1907 to 1914		606.92
Taxes and interest charges to 1914		8,055.70
Total cost to June 30, 1914		$26,353.10
Credit—rent from pasture and fence posts cut		1,102.92
Net investment		$25,250.18
Present value:		
150,000 posts, first class, at 20 cents	$30,000.00	
150,000 posts, second class, at 10 cents	15,000.00	
	$45,000.00	
Less cost of making at 5 cents each	15,000.00	
Net value		$30,000.00

The value of posts obtained by thinning has now reached a point where, added to rent received from owners of stock pastured, an annual revenue is obtained which pays for the small annual expense of supervision and for taxes, and meets the annual interest charges due to the heavy expenditures of the first four years of the life of the plantation. The total investment in 1922 is estimated at approximately $25,600. If conditions continue as at present there should be obtained from the plantation at that date not less than:

260,000 posts at 25 cents	$ 65,000.00
130,000 ties at 75 cents	97,500.00
Total	$162,500.00
Deduct cost of making	45,500.00
Net value	$117,000.00

The land has appreciated so that its value in 1914 was not less than $50 per acre, or for the 200 acres, $10,000. In 1922 the land will probably be worth not less than $150 per acre, or a total of $30,000, but it is land bought and held for future terminal expansion, and is being used with a view of getting the greatest return from it pending the date at which such expansion becomes necessary.

The results, however, seem to justify further development along these lines, and the subject is being looked into with a view of carrying the experiment further.

*Abstracted from a statement by A. S. Baldwin, chief engineer, Illinois Central, in the report of the committee on The Conservation of Natural Resources of the American Railway Engineering Association.

General News Department

In Canada all passengers by railroad now have to pay a tax on both railroad and sleeping car tickets.

The Southern Railway and the Seaboard Air Line have agreed to use their own tracks in common between Raleigh, N. C., and Cary, 12 miles. Each road has a single track, and the new tracks will be operated as a double track railway. There are no stations between Raleigh and Cary, except flag stops and a passing track.

The Globe Express Company is going out of business about June 1; and will be succeeded on the Denver & Rio Grande by the Wells-Fargo and on the Western Pacific by the American Express Company. The American, which operates over the Union Pacific, will then have a continuous line from the Atlantic to the Pacific.

The Virginia Railway & Power Company, operating electric cars in Norfolk, Va., announces that it will reward each conductor and motorman who has gone through the last six months without an accident, with a new suit of clothes. The names of the employees of the company who are to receive this favor are printed in a local newspaper.

A conference on the proposed purchase by the state of California of the Western Pacific Railroad, now in receivership, was held last week in the office of Governor Johnson of California. After the meeting the governor said, "All there is to say is that we have been considering the matter and when our study is completed a statement will be made."

The carferry "Ontario No. 2," of the Grand Trunk Railway, was successfully launched at the yards of the Polson Iron and Shipbuilding Company last week. The vessel was designed by William Newman, is of steel and will cost $500,000. It is to run between Coburg, Ont., and Charlotte, N. Y. It is 318 ft. long, 54 ft. beam and 20.5 ft. molded depth. She has capacity for 30 loaded 70-ton cars. Her speed will be 17 miles an hour. The vessel is built as an ice breaker and is expected to make her way through ice 4 ft. thick.

Postmaster General Burleson has issued another notice, dated last Sunday, replying to some criticisms of the railways' mail committee. He says that on important through routes between New York and Chicago the government pays the carriers $903,359 for tonnage which if carried by express would net the railways only $452,352 a year. He says that Mr. Peters' comparison between express rates and mail rates, using as an illustration express shipments of one pound each, is not fair; and in particular that the small packages make up but a very small proportion of the merchandise carried by express.

To its slogan, "Safety First," the Pennsylvania Railroad has added "courtesy first," and is to have some lectures at Philadelphia on two days this week for the benefit of employees on the Philadelphia terminal division and for passenger trainmen of other divisions who run to and from Philadelphia. Among the employees who have been notified to attend the courtesy meetings are assistant station masters, clerks in ticket offices, ticket examiners, ushers, elevator attendants, checkmen, station patrolmen, telephone operators, cab starters, package, parcel and ladies' room attendants, station porters, and clerks and others in freight agents' offices. Similar lectures will be given at other terminals.

A special committee of the Michigan legislature appointed to investigate rumors that the railroads were spending money improperly to influence the passage of the 2½ cents a mile passenger fare bill, after several hearings has rendered a report, in which it says: "There has been no improper conduct on the part of the representatives of the railroads, and there exists no grounds upon which to base the slightest suspicion that any agent or representative of the railways has made corrupt use of money. There never existed any so-called slush fund or publicity fund of $300,000, or $100,000, for the purpose of putting the fare bill through the legislature, but there has existed a fund, designated as publicity fund, of about $15,000, which was expended honestly and legitimately."

Among the worst of the innumerable acts of wanton vandalism committed by the different warring factions in Mexico, the destruction wrought on the property of the National Railways in Monterey by the Carrancistas on the eve of their recent evacuation of the city probably caps the climax. When the near approach of the Villa forces made it apparent to the Carranza followers that they would have to abandon the town, it was decided to celebrate their coming departure with an orgy of anarchy. Locomotives were sent out to gather up all the box cars on the adjacent divisions of the railway and bring them to Monterey for the purpose of making a bonfire of them. These cars—more than 600 in number—were hauled into town and lined up on the extensive division terminal tracks. On the last night the Carrancista officers gave an elaborate ball in the handsome passenger station of the National Railways, which ended with a mock ceremony in which the torch was applied to the costly passenger station and to the 600 box cars. Within a few hours all of this valuable property was in ruins.

Street Car Disaster in Detroit

A press despatch from Detroit, Mich., reports 15 persons killed and 20 injured on the afternoon of April 14, in a collision between a Detroit City street car and a string of freight cars pushed by a switching engine on the Detroit, Toledo & Ironton. The street car was heavily loaded with passengers homeward bound from their day's work. As the car approached the railroad crossing it stopped and the conductor ran ahead to see if the track was clear. He signaled the motorman to wait, but apparently the latter, who is said to have been inexperienced, misunderstood his meaning. He applied the power and the car ran rapidly down an incline and on to the railroad tracks.

Alaska Railway Authorized

Secretary Lane of the Interior Department announced on Saturday that the President had adopted the Susitna route for the proposed railway to be built by the Government to the interior of Alaska, and that he had decided to buy the Alaska Northern, extending from Seward inland 71 miles, which will be a part of the Government line. This line will be extended from its northern terminus northward through the Susitna valley across Broad Pass and down the Tanana river to Fairbanks, a total distance of 471 miles from Seward. A branch will also be run from Matanuska Junction eastward into the Matanuska coal fields, 38 miles. The Alaska Northern was purchased for $1,150,000, while the estimated cost of the entire system is $26,800,000. Seward is at the head of Resurrection Bay, about 300 miles west of the boundary between Alaska and the Dominion of Canada. Secretary Lane announced that construction work would be begun at once and that probably 40 miles could be completed this year.

Railroad Legislation in Maine

Laws pertaining to the railroads in the state of Maine passed by the session of the state legislature, recently adjourned, provide for but few changes over previous legislation.

Several amendments were made to the Public Utilities law of 1913, viz., permitting railroads to carry, free, police officers, firemen in uniform, municipal fire apparatus, editors and regularly employed reporters of newspapers; giving the Public Utilities Commission full power to investigate all accidents resulting in death or personal injury, on the premises of all public utilities; and where the utility is a common carrier and an accident occurs, it is required that it shall transport all witnesses over its lines free of charge; free transportation for the members of the commission, their employees and agents is provided; the commission is required to provide for a chief inspector of utili-

ties, who shall be "a practical railroad man" and perform such duties as the commission may require, at a salary left to the discretion of the commissioners; and amendments giving the commission all authority formerly held by the state railroad commission.

Laws were passed authorizing railroads to give passes as usual to their employees, even if the employee holds a public office; requiring railroads to issue 500-mile books at the same rate as thousand-mile books; and providing for disposing of all inflammable material along the railroad rights-of-way. Under the last law, anyone cutting any forest growth on property adjacent to the right-of-way of a railroad must clear away and dispose of all slash and debris within 50 ft. of the right-of-way. The laws passed are subject to the referendum, and do not become operative until 90 days after the adjournment of the legislature.

Legislation Affecting Railways

The lower house of the Michigan legislature has passed the bill establishing a sliding scale of passenger fares for railroads in the state, ranging from 2 to 3 cents a mile, according to the earnings of the railroads. The vote was 24 to 6. The bill provides that roads earning less than $1,200 a mile may charge three cents.

Next Wednesday, April 21, will be "Railroad Day" at Springfield, Ill., arrangements having been made to give the railroads a hearing before the House and the Senate committees on public utilities on the bills pending before the legislature to increase passenger fares generally throughout the state to the basis of 2½ cents a mile. The roads are planning to send a large delegation of railroad officers, headed by President C. H. Markham of the Illinois Central. The presidents of all the principal roads have signified their intention of being present.

The executive committee of the Chicago Association of Commerce has adopted a resolution opposing the extra crew and train limit bills pending in the Illinois legislature. The association's committee on legislation had recommended the adoption of the resolution at a previous meeting. "We believe these bills raise questions of public concern," said Charles L. Dering, president of the association. "It is evident that any unnecessary burden placed on the carriers must ultimately be borne by the shippers, thereby increasing the cost of transportation which eventually reflects upon the consumer."

Railroad Men's Improvement Society

At the semi-monthly meeting of the Railroad Men's Improvement Society, held at 90 West street, New York, on April 8, a paper was presented by C. E. Hildum, auditor of freight accounts of the Erie, entitled: The Audit Office Settlement Idea The Railroad Men's Improvement Society is a railroad club having a membership of over 300 of the younger men from the general offices of several of the railroads centering in New York City. Meetings are held on the second and fourth Thursdays of each month, usually in the rooms of the Trunk Line Association at 143 Liberty street, New York, and at these meetings papers are presented on subjects of interest to railroad men.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Curran, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama & Vicksburg	143	$66,656	$25,478	$103,231	$17,345	$28,104	$3,451	$46,960	$2,179	$5,600	$103,640	—$409	$8,600	—$9,009	—$18,959
Alabama Great Southern	309	263,365	65,773	358,374	44,112	83,098	13,204	134,834	2,197	7,913	269,584	88,791	15,154	73,620	12,881
Ann Arbor	294	120,327	33,154	163,955	13,080	22,291	4,919	79,300	214	7,270	127,074	36,881	10,580	26,282	20,073
Arizona Eastern	367	116,626	22,638	151,824	26,824	19,116	2,144	46,397	1,408	10,554	106,430	45,394	12,460	32,934	—38,725
Atchison, Topeka & Santa Fe	8,514	4,796,157	1,900,202	7,301,008	834,995	1,276,835	176,703	2,206,372	.....	149,378	4,637,122	2,663,886	409,503	2,248,412	506,962
Atlanta & West Point	93	48,186	31,251	95,225	8,547	22,874	5,092	31,185	1,591	4,238	73,527	21,698	5,785	15,908	—719
Atlanta, Birmingham & Atlantic	639	149,600	30,162	197,624	35,123	45,462	11,864	93,642	—163	10,894	196,823	801	13,100	—12,335	—38,995
Atlantic & St. Lawrence	167	105,471	14,580	130,583	14,530	26,452	4,649	75,292	.....	3,681	124,603	5,980	10,800	—4,820	—33,555
Atlantic City	170	53,926	44,350	105,548	25,920	22,541	1,541	75,036	123	1,008	126,259	—20,710	13,500	—34,210	26,427
Atlantic Coast Line	4,700	1,726,539	753,984	2,681,611	346,746	377,424	56,324	902,099	14,182	66,062	1,760,819	920,792	138,000	782,614	—186,051
Baltimore & Ohio—System	4,516	5,081,511	853,186	6,469,049	635,471	1,090,009	150,182	2,530,536	46,180	165,513	4,617,731	1,851,318	285,328	1,563,332	1,001,886
Baltimore & Ohio Chicago Terminal	79	.....	427	116,289	6,961	15,029	821	50,780	1,050	3,804	76,525	39,764	19,021	20,713	37,091
Bangor & Aroostook	631	291,419	35,947	343,524	37,235	45,900	2,428	101,193	2,244	9,380	198,344	145,180	12,525	132,655	115,047
Belt Ry. Co. of Chicago	24	.....	.....	240,607	13,620	26,783	828	89,866	.....	5,859	136,957	103,650	11,587	92,063	14,603
Bessemer & Lake Erie	205	172,986	20,800	202,980	38,395	135,709	8,675	106,305	.....	11,711	290,850	—87,870	17,003	—104,889	69,835
Bingham & Garfield	27	99,602	2,800	102,807	4,725	13,613	883	17,695	22	1,660	38,648	64,159	2,367	61,792	—517
Birmingham Southern	44	33,649	496	59,576	8,459	10,865	551	23,734	.....	3,378	46,987	12,589	2,063	10,526	4,937
Boston & Maine	2,302	1,954,480	925,795	3,210,802	390,753	475,544	28,593	1,560,181	14,599	94,314	2,563,983	646,819	155,000	491,819	517,542
Buffalo & Susquehanna R. R. Corporation	253	106,980	5,664	115,391	17,509	38,932	1,863	37,893	.....	5,452	101,650	13,741	2,600	11,141	—6,272
Buffalo & Susquehanna Railway	91	8,819	4,267	14,865	3,268	6,014	818	10,997	6	2,298	23,401	—8,535	1,600	—10,135	—12,090
Buffalo, Rochester & Pittsburgh	586	562,166	72,485	657,570	67,276	137,323	11,641	253,128	985	17,179	487,533	170,037	20,000	150,037	16,797
Canadian Pacific Lines in Maine	233	119,319	16,263	141,715	7,596	25,767	5,042	57,912	.....	3,426	99,743	41,972	12,000	29,972	36,025
Carolina, Clinchfield & Ohio	248	150,452	10,578	164,770	24,976	20,366	5,986	33,147	.....	9,801	93,455	71,315	14,250	57,065	—12,097
Carolina, Clinchfield & Ohio of S. C.	18	9,026	947	10,345	1,420	70	1,573	2,000	.....	763	5,825	4,520	750	3,770	—1,253
Central of Georgia	1,924	662,896	206,761	964,228	118,714	181,239	32,171	345,760	2,036	34,141	713,681	250,547	50,285	199,779	—30,105
Central of New Jersey	678	1,348,371	352,361	1,840,234	151,558	418,042	33,065	765,820	10,739	47,806	1,426,995	413,239	106,417	306,823	—61,163
Central New England	304	242,447	31,153	288,723	30,132	29,809	1,316	99,268	.....	3,958	164,456	124,266	14,998	109,268	69,846
Central Vermont	411	199,697	55,249	272,568	29,273	57,448	9,131	144,435	1,974	5,784	248,046	24,522	15,760	8,762	62,632
Charleston & Western Carolina	341	104,436	20,187	131,513	26,321	20,280	3,044	49,534	5	3,997	103,177	28,336	5,000	23,336	—1,472
Chesapeake & Ohio Lines	2,372	2,350,199	347,146	2,867,273	294,886	578,980	53,144	1,049,819	15,384	68,371	2,060,584	806,689	115,009	685,872	320,490
Chicago & Alton	1,033	674,835	247,569	1,015,923	150,662	257,892	35,038	427,497	8,475	30,343	909,907	106,016	45,012	60,665	180,093
Chicago & Eastern Illinois	1,282	801,650	203,257	1,092,446	135,981	237,026	27,196	448,316	9,089	35,811	893,269	199,177	53,600	145,312	19,873
Chicago & Erie	270	451,045	34,301	519,267	50,654	77,236	16,745	228,882	2,181	11,958	385,082	134,184	20,500	113,684	199,517
Chicago & North Western	8,108	3,944,023	1,307,196	5,812,349	520,424	999,358	117,567	2,439,796	41,615	156,832	4,271,670	1,540,679	375,000	1,165,350	173,844
Chicago, Burlington & Quincy	9,375	4,615,318	1,287,164	6,504,847	515,351	1,278,194	130,560	2,418,726	48,027	177,960	4,568,818	1,936,029	325,660	1,610,369	3,845
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	49,591	10,400	71,377	6,584	12,061	1,571	39,179	.....	1,262	60,658	10,719	2,870	7,849	2,738
Chicago Great Western	1,429	707,117	202,524	1,003,157	92,826	162,824	45,970	450,837	7,751	34,126	794,189	208,968	48,668	160,091	3,476
Chicago, Indianapolis & Louisville	618	296,532	114,111	454,555	32,041	52,059	17,820	174,460	101	14,765	291,244	163,311	26,318	136,980	116,406
Chicago Junction	24	.....	.....	151,096	21,445	19,779	1,082	94,005	.....	6,542	142,853	8,243	1,492	6,751	—5,373
Chicago, Milwaukee & St. Paul	10,067	4,644,701	1,079,556	6,472,696	608,211	1,177,215	137,032	3,174,210	49,270	159,580	5,179,181	1,293,515	386,022	907,320	—67,875
Chicago, Peoria & St. Louis	255	90,103	18,039	114,630	20,793	24,237	6,072	54,778	.....	5,105	110,986	3,645	5,700	—2,055	16,617
Chicago, Rock Island & Gulf	477	156,468	45,060	220,885	20,568	34,955	9,639	92,930	1,722	8,611	168,425	52,460	8,094	44,272	12,688
Chicago, Rock Island & Pacific	7,852	3,521,238	1,245,852	5,155,839	493,375	830,148	151,365	2,220,742	35,866	146,103	3,876,623	1,279,216	270,015	1,008,946	559,951
Chicago, St. Paul, Minn. & Omaha	1,753	962,562	306,601	1,359,192	113,329	195,030	26,922	631,151	12,889	34,426	1,013,538	345,655	77,425	267,291	—15,759
Chicago, Terre Haute & Southeastern	371	152,143	13,499	169,608	16,302	35,577	4,128	55,269	987	9,446	121,710	47,898	12,500	35,398	6,405
Cincinnati, Hamilton & Dayton	1,015	482,182	99,305	651,364	99,454	183,314	17,582	324,034	3,075	22,631	649,231	2,133	34,659	—32,689	85,536
Cincinnati, New Orleans & Texas Pacific	337	546,940	133,140	725,007	62,639	166,028	25,713	245,520	4,673	18,746	521,427	203,581	31,000	172,526	—63,852
Cincinnati Northern	246	92,645	13,096	109,906	17,720	26,309	2,616	40,268	.....	3,969	90,882	19,024	5,500	13,516	46,682
Cleveland, Cincinnati, Chic. & St. Louis	2,381	1,794,854	574,615	2,597,324	286,757	612,520	71,927	1,147,543	19,528	61,674	2,192,722	404,603	128,000	275,967	531,412
Colorado Midland	338	85,884	7,875	103,832	15,464	26,193	6,619	44,055	708	5,308	98,347	5,485	10,000	—4,515	—27,398
Colorado & Southern	1,089	414,607	83,812	541,386	50,096	141,032	9,874	188,114	3,421	19,225	411,761	129,625	36,803	92,815	3,291
Cumberland Valley	164	143,514	42,984	201,022	20,186	32,569	5,208	73,753	969	8,138	140,824	60,198	5,794	54,404	—7,811
Delaware & Hudson Co.	881	1,208,072	144,581	1,435,522	114,228	302,536	30,111	638,510	11,032	63,053	1,159,307	276,215	58,500	217,715	36,974
Delaware, Lackawanna & Western	960	2,024,357	548,551	2,890,450	205,819	532,212	95,297	1,092,294	23,838	80,576	2,014,218	876,232	186,600	689,608	105,822
Denver & Rio Grande	2,575	1,029,220	215,199	1,340,525	104,713	297,833	37,732	449,091	18,645	52,421	960,435	380,090	84,000	295,832	—27,953
Denver & Salt Lake	255	77,371	11,765	95,140	13,765	24,439	1,848	34,352	.....	4,912	79,316	15,824	7,000	8,824	15,781
Detroit & Mackinac	400	58,001	16,810	80,576	9,321	14,960	1,335	34,566	.....	3,246	63,428	17,148	7,504	9,644	—3,735
Detroit & Toledo Shore Line	79	127,954	.....	128,479	9,805	10,888	3,286	39,497	.....	2,878	66,354	62,125	5,750	56,375	2,746
Detroit, Grand Haven & Milwaukee	191	119,000	34,500	178,620	18,522	29,766	6,169	115,165	587	4,006	174,215	4,405	3,360	952	20,714
Detroit, Toledo & Ironton	441	92,845	9,576	109,749	9,095	24,060	3,235	67,266	.....	5,340	108,997	753	5,500	—4,747	213,393

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Duluth & Iron Range	273	$92,312	$15,091	$112,858	$28,003	$43,105	$944	$66,269	$1,007	$10,326	$149,654	—$36,796	$5,631	—$42,427	$14,827
Duluth, Missabe & Northern	369	53,794	21,351	80,377	26,565	51,578	1,669	55,406	3,410	11,380	150,008	—69,632	1,010	—70,642	76,255
Duluth, South Shore & Atlantic	628	159,604	44,697	221,245	27,390	34,132	8,136	103,429	3,168	10,647	186,903	34,342	16,000	18,331	—751
Duluth, Winnipeg & Pacific	185	112,495	15,276	134,531	7,432	17,642	1,834	49,692	1,157	6,462	84,219	50,312	6,731	43,581	41,736
El Paso & Southwestern Co.	1,027	407,697	105,419	557,752	80,668	84,155	16,781	162,176	5,436	23,775	372,786	184,966	34,889	150,064	—103,324
Elgin, Joliet & Eastern	776	558,393	5	594,926	64,150	117,917	5,853	204,220	.....	17,852	409,992	184,934	40,890	144,044	22,631
Erie	1,988	2,906,814	572,179	3,865,427	317,052	959,919	94,214	1,509,527	26,560	94,963	2,994,283	871,144	168,654	696,526	394,075
Florence & Cripple Creek	87	78,794	12,925	93,560	16,361	11,152	1,795	26,093	.....	3,021	58,422	35,138	6,607	28,531	—6,903
Florida East Coast	745	237,677	277,700	598,498	56,287	56,740	13,050	178,789	3,582	14,061	321,475	277,023	20,468	250,531	—26,348
Fort Worth & Denver City	454	340,338	91,374	453,229	49,096	78,200	6,691	197,127	2,366	15,737	349,218	104,012	12,621	91,391	28,474
Galveston, Harrisburg & San Antonio	1,350	532,325	221,855	835,605	116,399	141,826	28,591	381,085	8,483	36,002	710,759	124,846	39,624	85,161	—47,030
Georgia	307	143,795	47,235	206,708	18,981	55,483	11,918	93,030	408	7,067	186,887	19,821	3,629	16,100	—48,231
Georgia, Southern & Florida	395	93,276	46,629	158,057	23,629	30,074	6,459	75,836	768	10,461	147,227	10,830	10,122	603	—17,418
Grand Rapids & Indiana	575	257,160	96,371	376,328	48,461	78,032	10,883	183,238	138	13,411	334,162	42,166	21,594	20,552	47,622
Grand Trunk Western	347	385,000	101,000	521,951	49,392	126,886	17,648	261,165	4,278	13,275	472,644	49,307	35,920	13,264	5,724
Great Northern	8,077	2,719,337	717,168	3,914,717	360,591	529,954	87,330	1,342,724	53,509	95,940	2,468,262	1,446,455	345,690	1,100,321	739,454
Gulf & Ship Island	308	89,178	20,311	116,303	13,913	31,518	2,508	32,662	245	7,009	87,856	28,446	7,349	21,071	452
Gulf, Colorado & Santa Fe	1,937	1,069,153	183,136	1,310,638	195,218	184,270	30,690	525,002	.....	31,906	961,714	348,924	49,162	299,187	195,491
Hocking Valley	351	285,922	54,811	362,570	29,509	67,241	7,991	143,737	.....	16,163	264,641	97,929	34,050	63,879	69,564
Houston, East & West Texas	191	84,248	19,233	109,797	15,196	17,752	1,855	42,550	223	2,891	80,466	29,331	4,170	25,094	4,312
Houston & Texas Central	858	411,724	96,255	547,019	73,551	81,513	14,968	215,173	3,189	17,499	405,714	141,305	26,952	114,294	99,852
Illinois Central	4,767	3,386,545	939,934	4,729,205	592,385	1,006,982	99,396	1,823,444	29,065	130,416	3,659,654	1,069,551	269,400	798,565	58,230
Indiana Harbor Belt	110	.....	.....	250,367	23,744	27,143	2,630	126,739	.....	7,321	187,577	62,790	6,950	55,832	28,985
International & Great Northern	1,159	548,735	114,461	728,628	126,718	136,051	21,416	337,872	2,991	28,760	653,808	74,819	40,000	34,801	44,954
Kanawha & Michigan	177	171,431	22,727	200,256	25,499	59,381	2,799	64,973	.....	5,803	158,454	41,802	11,200	30,602	—2,708
Kansas City Southern	827	582,096	96,541	736,477	70,999	75,397	25,134	269,517	.....	35,853	468,396	268,081	48,169	219,714	4,423
Lake Erie & Western	900	373,362	48,829	443,617	61,216	78,009	14,013	190,101	.....	11,458	354,796	88,821	20,000	68,807	71,357
Lehigh & Hudson River	97	108,895	8,341	118,383	13,424	18,106	1,816	46,883	.....	3,698	83,928	34,455	4,150	30,305	6,985
Lehigh & New England	294	125,577	993	135,426	19,531	27,450	1,968	43,511	.....	5,226	97,686	37,741	5,104	32,637	—2,299
Lehigh Valley	1,443	2,495,052	235,120	2,910,302	309,663	618,469	68,002	1,215,825	9,184	70,504	2,289,909	620,393	142,500	477,518	317,739
Long Island	398	226,643	427,857	755,355	116,218	125,153	7,636	408,806	6,923	29,341	694,079	61,277	78,383	—17,144	—32,845
Louisiana & Arkansas	279	109,053	14,480	127,369	19,295	22,504	2,860	37,032	.....	3,750	85,442	41,927	7,500	34,346	—5,395
Louisiana Ry. & Navigation	351	131,273	19,472	160,474	27,922	16,186	5,714	64,424	.....	4,905	119,150	41,324	9,500	31,824	18,506
Louisiana Western	208	108,045	50,498	170,929	14,926	36,080	7,191	60,612	2,765	6,155	127,729	43,200	9,895	33,199	—6,754
Louisville & Nashville	5,034	2,758,387	797,022	3,839,947	765,888	797,694	106,648	1,354,255	17,458	104,687	3,111,888	728,059	127,987	599,698	—145,601
Louisville, Henderson & St. Louis	200	72,463	26,295	107,415	21,596	5,298	5,286	38,941	.....	3,827	74,949	32,466	3,800	28,659	11,192
Maine Central	1,219	624,453	179,158	855,575	108,122	128,341	8,427	339,349	1,534	24,498	609,395	246,181	53,076	193,091	74,208
Michigan Central	1,800	1,624,303	553,926	2,431,295	332,047	475,147	55,504	1,108,509	43,242	57,183	2,071,631	359,664	120,000	239,105	148,588
Midland Valley	380	72,977	28,116	107,541	17,975	16,122	2,122	38,721	.....	5,441	80,381	27,160	4,750	22,366	24,244
Minneapolis & St. Louis	1,646	605,595	127,965	772,298	92,393	112,012	19,383	347,940	.....	20,018	591,746	180,552	32,966	147,587	15,524
Minn., St. Paul & Sault Ste. Marie	4,127	1,554,485	314,064	2,019,070	182,433	315,274	43,152	772,874	11,877	48,123	1,372,306	646,764	79,009	567,754	218,033
Missouri & North Arkansas	365	56,548	20,960	83,933	27,375	22,994	2,824	50,753	.....	5,576	109,523	—25,590	6,000	—31,602	—11,468
Missouri, Kansas & Texas System	3,865	2,072,793	554,479	2,818,684	364,504	275,828	54,016	1,061,922	22,883	75,560	1,851,160	967,525	111,901	854,874	487,777
Missouri, Oklahoma & Gulf	334	82,815	14,320	100,722	24,299	20,476	4,244	49,924	111	7,161	106,215	—5,492	5,128	—10,672	14,816
Missouri, Oklahoma & Gulf Ry. of Texas	19	11,005	142	11,404	1,365	3,988	191	5,046	.....	660	11,250	154	140	14	—1,310
Missouri Pacific	3,920	1,486,242	324,039	2,005,317	245,534	418,631	49,917	887,164	10,464	53,330	1,665,039	340,278	98,590	239,864	125,334
Mobile & Ohio	1,122	683,786	85,699	809,118	73,147	128,830	38,388	313,457	2,589	28,011	584,423	224,695	33,153	191,348	103,310
Monongahela	75	81,209	1,808	84,562	12,752	7,594	867	21,136	.....	2,066	44,415	40,147	1,810	38,337	—18,930
Morgan's La. & Tex. R. R. & S. S. Co.	405	228,215	81,325	339,184	45,856	66,287	12,013	138,963	2,382	11,444	276,780	62,403	20,013	42,239	—3,479
Nashville, Chattanooga & St. Louis	1,231	598,109	178,093	849,618	118,867	171,695	45,991	354,758	9,098	28,576	718,797	130,821	26,000	104,687	—13,744
Nevada Northern	165	68,091	4,901	75,796	11,784	9,550	453	19,687	45	3,502	45,021	30,775	5,002	25,772	—26,634
New Orleans & North Eastern	204	200,840	42,114	274,362	25,714	57,907	9,306	101,109	6,060	11,569	211,666	62,697	14,500	48,197	—20,898
New Orleans Great Northern	283	88,102	17,859	118,731	17,385	23,261	2,347	35,613	178	5,928	84,712	34,019	3,125	30,894	—20,453
New Orleans, Mobile & Chicago	403	108,544	17,956	134,077	26,029	19,444	3,717	49,601	—9	7,331	106,113	27,964	6,395	21,563	—17,634
New Orleans, Texas & Mexico	286	87,055	17,210	110,171	27,605	17,665	4,085	46,838	.....	10,319	106,513	3,659	1,502	2,040	8,686
New York Central Railroad	5,984	7,353,498	2,930,721	11,997,020	1,310,667	2,816,526	247,941	4,686,915	199,047	342,675	9,603,771	2,393,249	781,736	1,610,194	.....
New York, Chicago & St. Louis	568	752,363	67,925	849,740	75,805	166,133	41,390	467,518	4,008	20,635	775,490	74,250	40,000	34,249	5,834
New York, New Haven & Hartford	2,003	2,220,832	1,849,088	4,590,967	437,583	647,056	25,932	1,811,153	44,510	139,891	3,105,267	1,485,700	195,000	1,289,683	788,590
New York, Ontario & Western	568	396,908	65,725	545,854	49,523	113,359	8,497	269,596	.....	14,528	455,502	90,352	20,000	70,352	34,958

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
New York, Philadelphia & Norfolk	112	$201,173	$28,105	$249,190	$23,747	$63,121	$5,365	$119,496	$4,076	$10,828	$226,633	$22,557	$9,500	$13,053	$15,457
New York, Susquehanna & Western	140	183,825	37,719	246,798	19,724	29,476	3,717	111,621	.....	4,642	168,208	78,590	13,208	65,235	45,104
Norfolk & Western	2,044	2,487,707	304,219	2,934,664	319,251	656,740	60,156	939,273	8,784	65,893	2,026,091	908,573	168,000	740,339	91,112
Norfolk Southern	900	213,883	61,847	298,580	40,947	47,871	5,969	119,913	95	20,062	234,857	63,723	9,978	53,734	—17,356
Northern Pacific	6,497	2,959,646	774,765	4,125,078	298,537	443,525	90,417	1,457,008	62,284	85,535	2,393,884	1,731,194	368,183	1,362,712	565,899
Northwestern Pacific	401	65,979	87,579	177,855	42,697	36,216	4,494	102,384	.....	6,699	190,956	—13,101	16,068	—29,184	—22,221
Oregon Short Line	2,162	912,364	261,978	1,303,818	154,615	237,801	32,697	362,769	21,135	52,299	860,046	443,772	78,264	365,011	—21,702
Oregon-Washington R. R. & Nav. Co.	2,028	710,949	257,712	1,082,435	99,266	148,306	38,156	404,289	9,722	54,339	752,382	330,052	100,018	229,876	1,785
Panhandle & Santa Fe	670	260,211	51,266	326,260	57,858	57,560	4,708	98,392	.....	7,684	226,202	100,157	9,357	90,801	66,421
Pennsylvania *Company*	1,757	2,418,340	652,551	3,424,768	498,385	796,622	76,479	1,411,408	29,789	109,686	3,922,369	502,398	257,507	244,094	217,388
Pennsylvania *Railroad*	4,512	8,929,816	2,508,958	12,687,674	1,870,832	2,990,918	320,786	5,248,625	199,193	415,734	11,046,088	1,641,586	634,476	1,005,346	209,022
Pere Marquette	2,312	981,260	240,233	1,326,871	109,491	188,193	31,366	597,667	3,446	37,226	967,250	359,621	—40,901	400,367	425,011
Philadelphia, Baltimore & Washington	717	652,412	575.155	1,380,913	220,369	307,578	44,325	663,685	32	44,567	1,280,558	100,356	53,735	46,610	50,569
Pittsburgh & Lake Erie	225	787,668	104,031	935,644	98,684	237,225	11,667	286,558	2,953	26,685	663,770	271,874	49,500	222,374	—104,408
Philadelphia & Reading	1,120	2,596,100	435,875	3,219,132	259,342	615,677	67,468	1,260,715	34,968	70,623	2,308,041	911,091	100,121	810,422	31,669
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	1,885,502	541,834	2,734,491	313,614	622,514	63,206	1,149,592	22,562	82,864	2,254,353	480,138	154,579	325,369	162,343
Port Reading	21	87,655	.....	110,488	—11,349	6,248	38	45,851	.....	341	41,129	69,359	12,000	57,359	25,007
Richmond, Fredericksburg & Potomac	88	103,275	92,972	230.343	16,400	28,849	3,471	82,641	6,488	7,479	145,328	85,015	6,476	78,537	—3,367
Rutland	468	131,282	67,306	225,039	26,824	42,755	7,892	100,010	992	5,042	183,516	41,523	16,780	24,743	29,157
St. Joseph & Grand Island	258	68,420	20,299	95,140	11,514	14,094	4,416	39,609	.....	4,548	74,180	20,960	7,620	13,302	3,365
St. Louis & San Francisco	4,746	2,249,260	662,964	3,136,177	365,643	461,835	72,003	1,078,384	.....	114,047	2,091,901	1,044,275	108,949	933,607	391,730
St. Louis, Brownsville & Mexico	548	111,651	55,189	181,825	29,403	14,406	6,054	63,009	.....	10,676	123,282	58,543	6,500	51,774	15,517
St. Louis, Iron Mountain & Southern	3,364	1,772,425	358,418	2,321,844	323,434	423,401	62,256	749,224	7,077	68,060	1,633,452	688,392	111,032	574,662	—175,393
St. Louis Merchants' Bridge Terminal	9	.....	123	145,864	14,190	8,993	772	76,151	.....	5,014	105,120	40,744	6,540	34,204	15,954
St. Louis, San Francisco & Texas	235	50,924	19,252	75,688	20,828	14,582	2,055	44,804	.....	4,142	86,410	—10,722	1,305	—12,028	—6,204
St. Louis Southwestern	943	431,477	75,107	533,034	60,526	95,076	24,301	164,369	2,741	25,828	370,904	162,130	35,239	126,872	—36,674
St. Louis Southwestern of Texas	810	228,901	52,893	304,205	65,460	71,176	11,402	160,395	435	17,133	319,596	—15,391	15,020	—30,505	20,179
San Antonio & Aransas Pass	724	205,657	60,766	285,866	71,902	52,745	6,109	137,922	.....	11,961	280,608	5,258	14,077	—9,015	—18,073
San Pedro, Los Angeles & Salt Lake	1,132	429,227	162,568	658,226	56,413	120,333	32,738	242,967	16,726	17,785	486,962	171,264	46,032	125,232	—56,980
Seaboard	3,101	1,158,268	403,429	1,763,623	201,240	259,793	63,217	658,409	15,843	55,089	1,253,592	510,031	86,006	423,029	—182,079
Southern	7,036	3,131,291	1,082,793	4,617,407	698,842	891,086	170,253	1,755,755	31,400	152,688	3,664,431	952,976	231,322	719,165	179,125
Southern in Mississippi	281	44,369	18,126	67,704	24,237	8,279	2,276	35,200	.....	3,969	73,687	—5,983	8,375	—14,364	—21,822
Southern Pacific	6,517	3,960,642	1,952,459	6,966,342	724,449	1,146,825	170,428	2,319,900	124,563	212,753	4,659,471	2,306,871	375,080	1,926,354	371,849
Spokane International	163	39,178	8,283	50,297	7,131	4,124	2,328	18,673	.....	3,577	35,833	14,465	3,174	11,202	—5,640
Spokane, Portland & Seattle	556	165,908	81,414	274,726	46,748	32,801	6,574	78,171	2,842	13,088	180,106	94,619	53,400	41,194	—11,220
Tennessee Central	294	75,852	24,895	107,964	29,343	14,973	5,385	46,383	.....	6,909	102,992	4,972	4,480	473	—24,257
Terminal R. R. Ass'n of St. Louis	35	.....	166	217,438	14,991	13,174	895	75,943	.....	4,864	109,867	107,571	28,199	79,372	23,483
Texas & New Orleans	469	188,648	73,775	290,963	49,455	75,241	7,707	130,817	2,977	9,613	275,737	15,226	15,805	—645	—9,273
Texas & Pacific	1,887	1,037,126	279,789	1,441,867	131,111	212,298	34,262	647,046	12,397	38,628	1,074,542	367,325	68,700	297,705	109,656
Toledo & Ohio Central	446	266,410	39,611	323,066	51,889	88,137	7,800	145,253	1,605	8,684	303,368	19,698	21,001	—1,311	6,568
Toledo, Peoria & Western	248	53,947	31,905	90,655	14,506	26,556	1,989	42,258	3,451	.....	88,761	1,893	6,100	—4,207	3,358
Toledo, St. Louis & Western	451	358,916	21,140	406,180	37,213	52,963	17,429	158,468	.....	7,496	273,568	132,612	17,864	114,748	62,584
Trinity & Brazos Valley	315	61,612	9,180	75,502	21,337	9,316	2,492	37,954	.....	7,810	78,910	—3,408	4,585	—8,018	8,115
Ulster & Delaware	129	23,222	11,544	48,072	8,961	17,440	1,024	31,080	61	2,654	61,219	—13,147	3,300	—16,412	—6,685
Union Pacific	3,617	2,134,463	619,277	3.185,136	296,635	567,698	110,963	977,625	58,951	118,305	2,127,787	1,057,349	254,035	602,779	—149,563
Union R. R. of Baltimore	9	113,462	16,606	131,793	14,135	.....	.....	4,764	.....	2,496	*21,395	110,398	5,930	104,467	50,545
Union R. R. of Pennsylvania	31	.....	.....	166,293	28,051	85,465	100	105,644	.....	2,455	221,716	—55,423	5,301	—60,724	11,908
Vandalia	**910**	**541,958**	170,328	806,061	74,862	187,968	22,651	350,084	10,001	22,221	667,787	138,274	34,152	104,121	15,572
Vicksburg, Shreveport & Pacific	171	49,795	24,852	87,461	19,238	26,505	4,336	39,149	1,975	4,965	96,168	—8,707	7,100	—15,807	—31,442
Virginia & Southwestern	**240**	**113,672**	9,682	126,758	30,729	35,103	2,329	40,292	.....	3,334	111,787	14,971	7,083	7,888	—10,495
Virginian	**504**	**366,732**	25,235	421,310	56,403	71,797	5,520	102,990	10,070	11,685	258,304	163,006	20,000	143,006	53,640
Wabash	2,519	1,597.144	381,775	2,183,334	226,081	423,935	105,542	1,007,489	10,770	55,398	1,829,005	357,329	78,875	278,211	221,836
Washington Southern	36	29,236	45,752	102,045	10,219	14,975	1,443	40,598	2,881	2,966	73,083	28,962	3,236	25,726	—548
West Jersey & Seashore	356	127,503	197,095	362,303	78,300	74,368	18,692	208,154	2,473	13,764	395,751	—33,449	28,806	—62,256	—33,125
Western Maryland	661	508.921	55,494	594,213	87,411	114,158	27,279	224,347	2,937	17,496	473,144	121,069	25,500	95,569	421,732
Western Pacific	943	249,631	63,696	334,626	63,104	42,081	21,485	126,830	9,039	20,170	282,709	51,916	28,885	22,832	59,061
Western Ry. of Alabama	133	54,411	30,458	97,827	18,005	24,958	6,249	31,532	1,500	4,986	87,230	10,597	5,270	5,208	—17,557
Wheeling & Lake Erie	459	266,951	35,142	337,229	32,167	88,341	10,529	158,163	1,052	14,004	304,257	32,972	30,121	2,851	—109,337
Yazoo & Mississippi Valley	1,382	784,549	146,472	979,378	133,762	119,296	16,579	346,300	2,212	26,449	643,831	335,547	51,000	284,368	17,968

REVENUES AND EXPENSES OF RAILWAYS

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Alabama & Vicksburg	143	$632,883	$280,869	$1,010,051	$156,764	$254,102	$29,384	$387,863	$22,750	$45,237	$896,100	$113,951	$60,386	$53,565	—$157,159
Alabama Great Southern	309	2,165,991	720,635	3,159,373	369,449	781,722	110,802	1,109,271	24,556	72,741	2,452,766	706,607	123,326	583,105	—212,353
Ann Arbor	296	1,086,966	371,965	1,558,913	165,165	213,470	39,234	636,993	3,160	59,512	1,117,533	441,379	101,140	339,846	3,496
Arizona Eastern	367	1,018,300	206,354	1,327,268	224,308	183,396	16,941	374,614	8,329	81,782	889,334	437,935	103,910	333,703	—297,978
Atchison, Topeka & Santa Fe	8,481	43,275,744	15,812,242	64,434,296	8,909,366	11,143,781	1,359,061	18,283,003	.....	1,234,318	40,881,977	23,552,318	3,142,630	20,395,890	2,120,682
Atlanta & West Point	93	390,636	294,619	793,464	120,123	187,849	43,468	252,201	12,975	36,870	653,423	140,041	52,978	86,843	—82,401
Atlanta, Birmingham & Atlantic	644	1,268,105	363,497	1,785,831	279,992	354,874	99,841	783,584	.....	82,822	1,601,113	184,718	95,193	89,123	—274,753
Atlantic & St. Lawrence	167	778,118	221,084	1,096,105	152,794	172,000	33,254	474,767	.....	27,246	860,061	236,045	86,400	149,645	81,673
Atlantic City	170	515,279	1,039,765	1,639,455	287,951	192,619	19,200	826,735	772	11,341	1,337,849	301,606	108,000	193,474	9,351
Atlantic Coast Line	4,684	13,369,386	5,342,335	20,332,310	3,122,886	3,655,541	461,848	7,475,310	70,409	594,115	15,338,233	4,994,077	1,104,000	3,886,824	—2,014,672
Baltimore & Ohio—System	4,516	45,737,239	9,757,926	60,093,755	6,128,667	11,038,205	1,263,160	23,842,170	368,169	1,403,829	43,682,833	16,410,922	2,173,122	14,227,555	—266,306
Baltimore & Ohio Chicago Terminal	79	.....	4,719	1,055,205	100,185	149,691	6,987	450,574	16,932	36,553	755,793	299,412	152,169	147,133	61,393
Bangor & Aroostook	631	1,818,416	436,088	2,388,807	374,325	383,941	20,627	737,022	9,049	76,309	1,600,800	788,007	78,322	709,644	53,906
Belt Ry. Co. of Chicago	24	.....	.....	2,195,928	118,218	197,941	7,017	785,390	.....	48,830	1,157,396	1,038,531	87,445	951,087	304,892
Bessemer & Lake Erie	204	5,285,094	272,775	5,660,085	467,812	1,243,605	82,136	1,311,385	10,106	93,294	3,175,124	2,484,961	148,016	2,336,887	611,003
Bingham & Garfield	27	736,016	28,486	768,963	70,871	102,827	7,399	142,664	643	14,906	339,310	429,653	16,170	413,483	—276,961
Birmingham Southern	44	318,284	7,447	574,090	119,982	99,397	3,961	220,529	.....	28,292	472,161	101,929	20,788	81,141	—139,611
Boston & Maine	2,302	17,682,016	10,654,947	31,185,821	4,667,013	4,746,372	290,475	13,637,746	135,538	779,276	24,256,420	6,929,402	1,296,001	5,633,401	779,638
Buffalo & Susquehanna R. R. Corporation	253	918,622	54,984	998,181	184,966	303,298	10,612	300,835	.....	42,951	842,662	155,519	20,800	134,719	—103,938
Buffalo & Susquehanna Railway	91	107,196	54,245	180,809	36,840	64,173	4,591	95,439	250	19,282	220,574	—39,765	12,800	—52,566	38,339
Buffalo, Rochester & Pittsburgh	586	5,387,013	770,721	6,387,779	838,030	1,486,174	97,611	2,122,283	10,345	146,534	4,700,977	1,686,802	160,000	1,526,599	—548,038
Canadian Pacific Lines in Maine	233	603,847	159,071	820,134	161,412	134,952	46,252	371,749	.....	29,065	743,430	76,705	96,000	—19,295	116,459
Carolina, Clinchfield & Ohio	248	1,278,447	121,192	1,433,954	143,240	183,078	51,861	283,260	.....	73,097	725,379	708,575	114,000	594,360	—305,330
Carolina, Clinchfield & Ohio of S. C.	18	74,249	11,706	88,287	8,489	690	13,557	16,796	.....	5,039	44,571	43,716	6,000	37,708	—23,705
Central of Georgia	1,924	5,355,183	2,105,489	8,300,639	1,127,761	1,569,645	272,039	2,929,310	11,019	271,726	6,158,088	2,142,552	372,945	1,766,416	—568,052
Central of New Jersey	678	13,757,215	4,047,471	18,868,444	1,621,849	3,471,061	246,814	6,639,393	103,735	392,233	12,472,685	6,395,759	958,569	5,437,151	—343,962
Central New England	304	2,077,674	318,322	2,515,051	531,466	276,075	9,492	860,373	.....	30,058	1,707,139	807,913	95,000	712,878	—118,025
Central Vermont	411	1,726,458	612,740	2,532,188	337,282	437,959	65,407	1,190,204	20,813	54,407	2,106,071	426,118	126,080	299,330	271,949
Charleston & Western Carolina	341	884,796	222,445	1,166,605	237,290	223,369	30,010	435,688	5	35,568	961,854	204,751	40,000	164,744	—125,098
Chesapeake & Ohio Lines	2,368	20,063,747	3,882,315	25,508,626	2,912,480	5,420,101	438,097	8,542,799	158,965	578,619	18,051,062	7,457,564	889,550	6,560,703	86,445
Chicago & Alton	1,033	6,221,370	2,650,758	9,671,582	1,107,223	2,202,317	293,254	3,547,573	78,647	238,864	7,467,878	2,203,703	360,373	1,841,347	637,561
Chicago & Eastern Illinois	1,282	7,213,273	1,914,229	9,896,305	1,177,339	2,067,291	188,506	3,728,687	64,330	292,403	7,514,756	2,381,549	421,600	1,959,188	597,556
Chicago & Erie	270	3,156,548	394,420	3,926,833	603,628	216,498	153,640	1,855,375	18,294	101,738	2,899,642	1,027,191	120,993	906,156	1,325,820
Chicago & North Western	8,108	35,887,779	14,131,434	55,628,842	7,338,164	8,852,968	883,973	20,305,236	404,180	1,172,447	38,835,061	16,793,780	3,000,000	13,790,428	—724,324
Chicago, Burlington & Quincy	9,326	43,853,421	14,009,046	63,361,665	6,102,426	10,639,700	1,082,154	20,136,390	511,406	1,394,836	39,866,911	23,494,754	2,626,138	20,868,616	—82,118
Chicago, Detroit & Can. Gd. Trunk Jctn.	60	424,084	121,566	634,296	82,412	98,093	13,319	344,612	.....	11,505	549,942	84,355	22,960	61,377	—27,589
Chicago Great Western	1,428	6,616,512	2,112,401	9,531,403	1,235,222	1,627,674	375,208	3,518,045	54,947	282,046	7,084,542	2,446,861	389,348	2,054,321	—41,686
Chicago, Indianapolis & Louisville	618	2,799,277	1,143,404	4,317,612	466,387	784,864	162,735	1,617,423	1,352	138,909	3,169,633	1,147,979	212,025	935,601	—74,958
Chicago Junction	24	.....	.....	1,303,936	168,563	147,051	8,159	730,196	.....	38,453	1,092,423	211,512	15,929	195,436	—97,004
Chicago, Milwaukee & St. Paul	10,028	43,251,705	12,267,910	61,958,881	7,194,034	9,016,311	1,193,088	24,798,661	493,496	1,202,120	42,577,923	19,380,958	3,217,154	16,145,589	—1,814,962
Chicago, Peoria & St. Louis	255	741,810	167,405	965,510	160,476	177,413	41,563	410,252	.....	36,706	826,410	139,100	39,900	99,200	184,794
Chicago, Rock Island & Gulf	477	1,526,557	411,863	2,092,002	241,427	299,830	77,299	801,594	13,980	62,891	1,497,000	595,002	61,213	533,375	51,144
Chicago, Rock Island & Pacific	7,852	31,814,283	12,105,341	47,224,999	6,426,903	7,659,336	1,173,091	18,824,508	320,391	1,109,466	35,481,726	11,743,274	2,141,091	9,599,270	376,896
Chicago, St. Paul, Minn. & Omaha	1,753	8,026,821	3,454,447	12,377,292	1,388,196	1,650,149	229,480	4,685,933	117,465	288,499	8,343,609	4,033,683	701,671	3,328,791	—40,619
Chicago, Terre Haute & Southeastern	372	1,356,435	132,919	1,531,468	208,216	353,409	29,263	471,213	7,558	79,483	1,149,142	382,326	95,000	287,326	119,015
Cincinnati, Hamilton & Dayton	1,015	4,770,458	1,033,314	6,494,293	946,677	1,345,567	159,711	2,940,448	23,790	157,789	5,572,040	922,254	291,921	628,416	183,966
Cincinnati, New Orleans & Texas Pacific	337	4,685,180	1,215,750	6,264,259	624,444	1,652,215	202,898	1,994,227	48,345	164,303	4,684,540	1,579,719	248,000	1,331,281	—634,652
Cincinnati Northern	246	858,326	150,203	1,052,048	154,221	207,660	21,573	349,258	.....	28,331	761,043	291,005	42,463	248,253	313,242
Cleveland, Cincinnati, Chic. & St. Louis	2,368	16,301,825	5,741,665	24,181,738	2,588,592	4,817,268	626,998	9,397,381	189,080	494,295	18,072,702	6,109,036	1,037,027	5,062,403	3,260,592
Colorado Midland	338	982,521	162,070	1,271,883	196,619	273,743	60,177	502,278	9,409	45,001	1,087,226	184,656	69,709	114,947	134,448
Colorado & Southern	1,089	3,972,299	983,532	5,341,627	626,311	1,180,063	85,597	1,669,411	32,595	156,564	3,750,540	1,591,087	281,845	1,308,894	189,813
Cumberland Valley	164	1,372,016	448,658	1,933,754	328,065	273,127	36,257	677,872	6,899	65,414	1,387,635	546,119	45,659	500,460	—95,149
Delaware & Hudson Co.	881	12,152,213	1,959,507	14,941,806	1,096,880	2,535,267	214,507	5,538,509	97,871	502,567	9,973,038	4,968,768	450,619	4,517,661	.....
Delaware, Lackawanna & Western	960	20,080,330	5,681,347	28,585,788	3,066,578	4,656,760	580,664	9,221,649	243,464	603,699	18,182,556	10,403,232	1,324,032	9,077,866	50,193
Denver & Rio Grande	2,568	11,100,145	2,983,001	15,020,581	1,877,914	2,782,829	305,823	4,420,824	212,275	423,113	10,013,475	5,007,106	703,500	4,302,639	—39,843
Denver & Salt Lake	255	877,272	230,385	1,170,317	138,313	208,168	18,888	392,073	.....	42,887	797,318	372,999	45,000	327,999	136,233
Detroit & Mackinac	400	445,275	213,440	715,569	91,678	124,193	17,224	271,516	1,021	22,336	527,968	187,601	52,332	135,269	—27,544
Detroit & Toledo Shore Line	79	1,006,164	.....	1,008,950	101,379	80,978	15,566	290,492	.....	22,492	510,906	498,044	47,700	450,344	—66,852
Detroit, Grand Haven & Milwaukee	191	1,079,089	429,749	1,750,944	259,639	269,699	54,610	902,200	7,336	38,162	1,531,646	219,298	26,880	191,402	—53,976
Detroit, Toledo & Ironton	441	1,082,751	121,352	1,279,140	169,957	215,521	31,326	768,836	.....	46,266	1,231,907	47,233	47,500	—268	468,149

REVENUES AND EXPENSES OF RAILWAYS

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
Duluth & Iron Range	287	$2,666,307	$148,600	$2,930,468	$540,737	$496,972	$8,413	$719,291	$20,422	$71,198	$1,857,032	$1,073,436	$149,029	$924,406	—$1,312,538
Duluth, Missabe & Northern	366	3,043,651	217,895	3,343,659	412,109	555,119	16,183	715,901	21,294	109,269	1,829,875	1,513,784	174,480	1,339,303	—1,361,626
Duluth, South Shore & Atlantic	628	1,149,861	606,266	1,939,072	351,398	282,809	65,147	777,036	30,577	83,958	1,590,924	348,148	127,970	220,099	—108,800
Duluth, Winnipeg & Pacific	185	726,283	145,144	898,010	141,381	157,581	18,286	336,550	8,823	48,607	711,229	186,781	44,789	141,992	—83,598
El Paso & Southwestern Co	1,028	3,738,256	875,686	4,996,042	624,894	711,511	145,941	1,361,532	45,389	185,432	3,062,271	1,933,770	261,186	1,659,358	—95,195
Elgin, Joliet & Eastern	777	5,080,091	44	5,403,049	561,200	1,049,232	45,979	1,672,307	.....	147,011	3,475,389	1,927,659	279,130	1,648,497	—473,956
Erie	1,988	26,669,556	6,147,185	36,249,860	3,995,330	8,729,154	746,867	13,341,344	253,681	793,554	27,772,026	8,477,834	919,096	7,535,540	—530,467
Florence & Cripple Creek	87	656,730	126,614	798,486	92,081	78,205	16,362	234,147	.....	31,734	452,529	345,957	45,283	300,674	—9,721
Florida East Coast	707	1,566,043	1,206,363	3,220,626	482,832	443,588	73,656	1,084,421	24,511	134,875	2,219,615	1,001,010	154,468	845,710	249,161
Fort Worth & Denver City	454	2,578,537	1,056,469	3,831,327	368,004	560,736	60,203	1,550,678	26,106	114,745	2,680,471	1,150,856	94,425	1,056,431	257,218
Galveston, Harrisburg & San Antonio	1,345	5,103,755	2,022,328	7,687,398	1,032,545	1,329,621	232,289	3,344,397	70,499	283,713	6,286,597	1,400,800	305,748	1,093,940	—151,563
Georgia	307	1,285,025	509,548	1,942,143	222,448	401,611	95,528	844,850	2,493	60,697	1,627,628	314,515	32,340	281,609	—209,577
Georgia, Southern & Florida	395	871,186	465,361	1,525,967	204,551	316,038	58,240	620,230	2,212	82,730	1,284,001	241,966	75,664	164,648	—83,060
Grand Rapids & Indiana	575	2,035,762	1,282,248	3,612,831	390,934	581,936	88,385	1,539,074	13,167	112,577	2,726,072	886,759	188,530	695,741	123,796
Grand Trunk Western	347	3,233,512	1,207,278	4,769,693	771,955	938,640	156,452	2,078,734	59,028	119,362	4,124,172	645,521	287,360	357,403	—157,828
Great Northern	8,077	34,092,282	9,226,473	47,940,922	4,504,983	4,858,018	776,875	12,649,913	565,391	832,548	24,139,900	23,801,022	3,015,913	20,783,070	837,555
Gulf & Ship Island	308	800,329	208,734	1,075,171	135,234	240,759	19,666	295,174	1,980	56,307	749,121	326,050	61,555	264,332	—152,658
Gulf, Colorado & Santa Fe	1,937	8,968,372	2,091,540	11,599,712	1,521,922	1,656,495	221,991	3,997,957	.....	273,344	7,660,052	3,939,661	383,806	3,552,736	1,705,086
Hocking Valley	352	3,419,283	586,643	4,303,129	508,551	833,385	75,835	1,403,052	.....	114,906	2,935,728	1,367,401	300,900	1,066,501	—241,063
Houston, East & West Texas	191	632,835	211,245	893,181	165,019	145,224	15,365	374,654	223	25,139	725,372	167,808	32,932	134,680	—88,702
Houston & Texas Central	856	3,305,731	1,037,992	4,641,179	773,846	647,724	122,617	1,831,859	14,596	141,143	3,528,850	1,112,330	199,172	912,291	151,180
Illinois Central	4,769	30,505,133	8,864,809	42,632,354	5,683,441	9,246,868	832,572	15,423,551	241,041	1,017,498	32,220,621	10,411,733	2,176,400	8,221,085	—31,877
Indiana Harbor Belt	110	.....	.....	2,192,870	288,805	210,721	21,848	970,986	.....	60,652	1,553,012	639,858	60,307	578,913	187,669
International & Great Northern	1,159	4,665,234	1,272,516	6,403,722	1,039,178	1,072,321	185,317	2,801,962	23,118	238,219	5,360,115	1,043,607	260,000	783,097	—666,844
Kanawha & Michigan	177	1,695,445	237,101	1,987,105	273,431	498,133	20,953	594,513	28	52,876	1,439,935	547,170	92,001	455,136	—83,559
Kansas City Southern	827	5,200,460	990,487	6,813,404	736,376	799,518	230,368	2,311,946	.....	334,369	4,383,933	2,429,471	381,637	2,045,467	—306,135
Lake Erie & Western	900	3,076,619	525,814	3,797,898	525,914	649,818	113,329	1,542,704	.....	97,414	2,929,179	868,720	186,541	681,188	223,983
Lehigh & Hudson River	97	1,072,095	78,115	1,164,563	161,600	158,209	11,277	431,372	.....	34,293	796,752	367,811	33,200	334,611	98,592
Lehigh & New England	294	1,571,306	10,191	1,660,166	217,644	243,554	14,317	422,401	.....	47,139	945,054	715,112	44,227	670,885	166,744
Lehigh Valley	1,444	23,576,255	2,807,538	28,031,045	3,065,690	5,584,408	613,533	10,290,997	97,370	577,919	20,226,503	7,804,542	1,127,500	6,668,457	110,345
Long Island	398	2,427,809	5,259,606	8,850,594	938,700	953,201	92,176	3,754,054	58,025	223,216	6,019,372	2,831,221	553,213	2,275,895	557,519
Louisiana & Arkansas	279	925,565	150,867	1,108,724	199,473	185,367	21,808	305,585	.....	33,319	745,111	363,613	52,400	310,969	—49,222
Louisiana Ry. & Navigation	351	1,065,881	173,465	1,322,167	247,985	140,598	45,206	546,171	.....	41,726	1,021,687	300,480	64,000	236,480	—2,234
Louisiana Western	208	934,728	457,902	1,487,531	149,319	275,006	54,509	464,771	23,200	51,234	1,017,938	469,593	83,198	386,212	31,558
Louisville & Nashville	5,029	24,854,059	7,501,595	34,810,656	5,677,715	7,155,472	893,615	11,999,550	129,402	827,466	26,613,044	8,197,613	1,425,153	6,768,794	—2,150,258
Louisville, Henderson & St. Louis	200	619,733	266,479	947,597	193,387	127,135	42,768	325,331	.....	25,773	714,394	233,203	30,400	202,748	—11,407
Maine Central	1,214	4,701,867	2,354,370	7,602,416	1,082,886	1,160,529	87,888	2,895,596	47,535	211,741	5,495,300	2,107,117	412,683	1,694,277	104,761
Michigan Central	1,800	13,535,891	6,039,134	22,200,311	2,482,941	3,565,099	508,829	9,212,465	399,988	450,746	16,620,069	5,580,242	1,045,350	4,350,938	1,070,543
Midland Valley	380	645,033	283,774	988,316	189,803	169,562	16,514	324,750	.....	44,738	745,366	242,950	50,826	191,787	37,590
Minneapolis & St. Louis	1,646	5,223,564	1,324,896	6,934,353	785,088	984,713	143,832	2,663,882	376	165,185	4,743,077	2,191,276	308,733	1,882,543	187,385
Minn., St. Paul & Sault Ste. Marie	4,111	13,816,607	4,115,270	19,390,440	2,151,596	2,777,108	380,469	6,277,245	116,639	391,625	12,040,946	7,349,495	793,111	6,556,384	133,507
Missouri & North Arkansas	365	509,206	249,358	816,882	233,028	176,023	27,574	411,846	.....	45,572	894,043	—77,162	48,000	—125,501	—158,612
Missouri, Kansas & Texas System	3,865	15,551,610	5,699,900	22,848,689	2,992,715	3,066,324	444,469	8,258,999	208,686	689,793	15,566,274	7,282,415	877,900	6,400,102	1,194,781
Missouri, Oklahoma & Gulf	334	643,506	155,257	836,278	182,103	139,355	33,166	383,887	856	45,912	785,279	50,999	50,431	46	3,093
Missouri, Oklahoma & Gulf Ry. of Texas	19	86,932	2,454	90,936	12,809	17,099	1,763	35,794	.....	4,397	71,861	19,075	1,460	17,615	7,795
Missouri Pacific	3,920	14,669,567	3,240,188	19,511,859	2,451,120	3,681,057	473,368	7,583,092	61,676	475,838	14,726,150	4,785,708	788,720	3,986,670	1,581,247
Mobile & Ohio	1,122	5,988,929	867,341	7,289,587	745,253	1,270,113	322,119	2,829,187	21,153	231,524	5,419,350	1,870,236	250,579	1,618,742	—92,954
Monongahela	71	659,126	16,592	689,417	125,652	60,279	5,095	184,694	.....	16,212	391,932	297,486	13,028	284,458	—273,746
Morgan's La. & Tex. R. R. & S. S. Co.	405	2,114,249	716,726	3,086,907	374,987	567,615	91,353	1,201,267	20,136	94,887	2,349,618	737,290	158,882	574,929	—89,523
Nashville, Chattanooga & St. Louis	1,231	4,983,949	1,745,999	7,361,415	970,583	1,498,708	357,083	3,007,311	74,013	235,983	6,143,491	1,217,924	216,491	1,000,589	—528,073
Nevada Northern	165	586,137	62,464	675,693	125,971	105,072	3,762	176,232	496	30,442	441,976	233,717	40,248	193,418	—326,024
New Orleans & North Eastern	204	1,738,308	366,452	2,322,699	243,050	484,314	77,407	832,871	46,611	94,267	1,778,520	544,179	117,490	426,689	—81,941
New Orleans Great Northern	283	765,211	196,059	1,058,742	137,625	163,136	20,798	324,301	1,444	51,536	698,840	359,902	23,275	336,611	—155,179
New Orleans, Mobile & Chicago	403	928,222	200,866	1,194,458	232,494	164,616	30,427	420,033	—32	54,270	901,808	292,650	50,281	242,269	—259,659
New Orleans, Texas & Mexico	286	815,602	158,152	1,025,677	222,053	128,342	30,777	416,097	.....	74,803	872,071	153,606	13,085	140,405	—27,973
†New York Central Railroad	5,984	15,118,188	6,368,158	25,100,869	2,676,243	5,679,295	480,051	9,753,810	416,372	698,633	19,704,404	5,396,465	1,577,506	3,816,951	.....
New York, Chicago & St. Louis	568	6,275,517	922,705	7,528,043	907,303	1,005,751	336,998	3,518,849	40,344	158,878	5,968,123	1,559,920	321,267	1,237,981	—2,267
New York, New Haven & Hartford	2,003	19,674,159	18,076,202	42,408,061	5,147,398	6,377,155	282,873	16,296,299	385,347	1,064,383	29,541,987	12,866,075	1,779,000	11,083,939	1,192,583

†Figures shown here are for two months ending February 28, 1915.

REVENUES AND EXPENSES OF RAILWAYS

EIGHT MONTHS OF FISCAL YEAR ENDING JUNE 30, 1915—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comn. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.				
New York, Ontario & Western	568	$4,112,758	$1,154,145	$6,119,878	$779,848	$1,123,098	$65,386	$2,399,896	.....	$123,421	$4,491,649	$1,628,229	$158,824	$1,469,373	$84,056
New York, Philadelphia & Norfolk	112	1,897,380	337,984	2,446,981	239,291	494,035	35,191	1,083,116	$37,140	79,642	1,968,414	478,567	77,800	400,561	21,016
New York, Susquehanna & Western	140	1,464,265	351,107	2,024,711	198,291	239,269	17,473	919,498	.....	43,521	1,416,951	607,760	31,270	564,877	144,930
Norfolk & Western	2,041	23,098,184	3,180,602	27,414,833	3,667,934	5,473,543	471,095	8,334,935	74,850	552,201	18,207,838	9,206,995	1,206,000	8,000,647	—149,644
Norfolk Southern	900	1,634,525	719,016	2,551,318	348,314	411,408	58,339	971,598	704	159,222	1,949,585	601,732	87,489	512,867	—215,653
Northern Pacific	6,451	30,458,601	9,398,083	43,731,488	5,553,903	5,551,579	733,510	13,196,628	642,971	736,739	25,577,979	18,153,508	3,177,509	14,974,188	—962,607
Northwestern Pacific	401	948,553	1,205,711	2,428,128	436,953	321,770	37,512	936,149	.....	67,227	1,766,664	661,464	128,129	533,235	—86,419
Oregon Short Line	2,161	9,747,609	2,975,871	13,905,837	1,876,604	1,919,994	244,704	3,460,454	211,806	438,451	8,082,064	5,823,774	820,860	5,001,333	—934,950
Oregon-Washington R. R. & Nav. Co.	1,991	6,767,764	2,929,304	10,624,091	1,184,771	1,273,115	308,604	3,545,789	98,908	454,368	6,803,317	3,820,774	757,926	3,061,591	206,774
Panhandle & Santa Fe	670	2,077,556	452,376	2,655,575	475,963	510,154	31,161	836,566	.....	68,772	1,922,616	732,959	71,509	660,434	411,578
Pennsylvania *Company*	1,757	25,112,560	6,572,821	35,360,539	5,239,927	6,692,095	615,106	13,285,157	288,194	896,050	27,016,530	8,344,009	2,101,831	6,240,395	—2,020,239
Philadelphia & Reading	1,120	24,560,576	4,409,859	30,483,902	2,857,330	5,625,424	367,066	11,064,309	135,581	557,125	20,598,400	9,885,501	800,664	9,080,646	—1,404,612
Pennsylvania *Railroad*	4,512	84,631,121	25,899,896	121,817,757	16,359,977	24,630,835	1,668,404	46,321,113	1,814,595	3,263,972	94,058,896	27,758,861	5,163,553	22,581,730	—828,577
Pere Marquette	2,312	8,301,230	2,765,210	12,085,670	1,066,921	2,314,131	258,981	4,764,096	37,681	344,429	8,783,112	3,302,558	330,050	2,970,800	2,149,425
Philadelphia, Baltmore & Washington	717	6,438,523	5,531,894	13,356,830	2,062,210	2,539,038	221,655	5,773,371	126	354,909	10,951,308	2,405,522	457,460	1,947,165	209,709
Pittsburgh & Lake Erie	225	7,916,336	1,105,225	9,430,170	1,254,694	2,156,556	114,138	2,631,999	26,856	222,644	6,406,887	3,023,283	409,596	2,613,562	—1,610,319
Pittsburgh, Cincinnati, Chic. & St. Louis	1,479	17,238,017	5,407,979	25,621,689	3,305,712	5,040,265	524,792	9,691,680	191,521	632,338	19,386,308	6,235,381	1,303,202	4,930,256	115,648
Port Reading	21	822,335	.....	1,002,181	93,394	66,330	310	349,265	.....	2,995	512,292	489,889	96,000	393,889	—5,587
Richmond, Fredericksburg & Potomac	88	909,305	640,126	1,797,763	160,674	240,648	28,271	689,157	35,244	57,510	1,211,503	586,260	56,450	529,654	—35,006
Rutland	468	1,259,705	772,193	2,313,706	286,129	399,066	65,190	918,918	9,559	45,981	1,724,844	588,863	136,999	451,864	—57,192
St. Joseph & Grand Island	273	766,308	205,200	1,048,283	175,240	155,896	37,643	382,076	.....	42,054	792,908	255,374	64,783	190,499	80,073
St. Louis & San Francisco	4,746	18,927,718	6,987,841	27,727,889	3,770,612	4,365,520	526,220	9,350,084	.....	720,734	18,733,171	8,994,719	821,172	8,160,518	380,617
St. Louis, Brownsville & Mexico	548	870,478	492,049	1,497,252	276,815	165,302	42,701	567,637	.....	86,537	1,130,239	367,013	50,423	316,321	27,190
St. Louis, Iron Mountain & Southern	3,364	15,363,350	3,602,604	20,540,208	2,941,695	3,673,510	465,874	6,540,349	66,432	502,471	14,190,331	6,349,878	900,256	5,438,812	—2,004,428
St. Louis Merchants' Bridge Terminal	9	.....	1,419	1,231,670	155,854	57,484	6,215	625,450	.....	51,790	896,793	334,877	57,029	277,840	116,802
St. Louis, San Francisco & Texas	235	569,812	213,333	835,798	197,247	138,640	18,388	282,934	.....	36,739	773,948	61,850	10,222	51,598	—169,277
St. Louis Southwestern	943	3,676,343	822,075	4,774,091	589,069	836,202	205,756	1,362,313	26,235	210,079	3,226,360	1,547,731	256,194	1,290,967	—729,971
St. Louis Southwestern of Texas	810	1,759,852	647,856	2,610,254	616,617	650,781	97,355	1,231,101	6,446	142,807	2,707,433	—97,179	117,129	—215,078	—225,119
San Antonio & Aransas Pass	724	1,816,800	741,729	2,731,868	536,994	505,073	52,752	1,286,587	.....	93,133	2,474,321	257,547	100,156	156,690	—482,245
San Pedro, Los Angeles & Salt Lake	1,132	3,837,749	1,614,133	6,018,525	615,863	956,763	261,083	2,016,689	113,187	146,363	4,109,947	1,908,578	334,558	1,573,514	—252,505
Seaboard	3,100	9,267,451	3,061,744	13,845,985	1,638,959	2,100,553	510,553	5,187,709	71,376	439,832	9,946,725	3,899,261	718,151	3,176,054	—1,246,508
Southern	7,036	26,918,822	11,386,489	42,035,985	5,831,768	7,588,481	1,465,673	15,552,382	267,637	1,354,052	31,933,117	70,102,868	1,721,603	8,369,670	—3,697,404
Southern in Mississippi	281	430,805	226,291	720,987	179,400	69,978	19,396	324,044	.....	29,618	622,437	98,550	67,657	30,808	—119,773
Southern Pacific	6,513	39,269,646	18,069,359	63,818,216	6,386,312	9,230,858	1,294,213	20,605,817	1,071,029	1,835,109	40,249,201	23,569,015	3,258,001	20,289,200	—2,210,599
Spokane International	163	385,514	114,841	526,715	88,868	38,304	18,079	173,484	30	28,836	347,602	179,114	35,431	143,556	—126,163
Spokane, Portland & Seattle	556	1,831,565	980,005	3,095,449	376,378	281,171	60,412	714,284	27,135	107,236	1,566,425	1,529,024	427,200	1,100,194	—31,770
Tennessee Central	294	659,176	262,811	985,568	234,547	133,634	43,988	397,102	.....	54,026	863,157	122,412	35,807	86,486	—167,595
Terminal R. R. Ass'n of St. Louis	35	.....	1,456	1,819,434	146,254	98,382	7,336	637,748	.....	42,645	932,365	887,069	229,669	657,400	228,092
Texas & New Orleans	469	1,653,192	714,892	2,629,538	439,634	647,845	62,948	1,102,848	78,501	84,569	2,415,484	214,055	127,324	85,209	—138,243
Texas & Pacific	1,887	8,663,400	2,890,538	12,531,394	1,243,785	1,910,451	296,069	5,238,145	116,492	310,854	9,106,859	3,424,536	558,736	2,862,301	—155,309
Toledo & Ohio Central	446	2,920,156	419,552	3,552,190	510,083	677,716	64,252	1,337,164	14,030	79,338	2,682,583	869,606	179,355	688,486	139,688
Toledo, Peoria & Western	248	466,967	305,713	822,624	127,250	214,930	19,527	357,720	28,656	.....	748,083	74 541	48,800	25,736	28,109
Toledo, St. Louis & Western	451	2,635,421	225,460	3,075,765	368,549	468,377	133,254	1,203,802	.....	67,558	2,241,539	834,226	191,116	643,110	—241,163
Trinity & Brazos Valley	334	570,840	139,205	764,137	161,659	81,228	24,907	358,880	.....	65,161	691,835	72,302	34,720	37,350	680
Ulster & Delaware	129	334,836	246,875	696,977	109,333	129,603	11,782	328,742	470	29,784	609,713	87,264	26,400	60,174	—66,406
Union Pacific	3,616	25,530,633	6,624,659	35,962,960	4,105,429	4,975,972	749,128	9,030,258	564,314	979,399	20,390,580	15,572,380	1,586,159	13,982,575	—168,652
Union R. R. of Baltimore	9	894,645	172,469	1,081,509	105,050	.....	.....	37,109	.....	19,831	161,989	919,520	45,712	873,807	2,030
Union R. R. of Pennsylvania	31	.....	.....	2,238,070	339,151	764,170	809	1,003,109	.....	26,039	2,133,278	104,793	24,773	80,020	—278,202
Vandalia	910	5,027,069	1,619,245	7,479,468	1,009,722	1,493,495	188,221	2,942,920	78,260	173,724	5,886,343	1,593,124	257,577	1,335,397	—310,293
Vicksburg, Shreveport & Pacific	171	514,252	312,341	930,478	163,731	217,630	29,338	369,087	18,639	40,411	838,836	91,643	57,207	34,435	—215,789
Virginia & Southwestern	240	1,100,793	110,988	1,248,168	202,128	290,352	19,520	366,407	.....	30,548	908,955	339,213	52,499	286,714	—55,343
Virginian	503	3,345,200	266,755	3,856,995	490,456	682,429	43,151	898,423	79,439	88,958	2,262,327	1,594,669	172,500	1,421,930	—392,419
Wabash	2,519	13,650,166	4,270,337	19,690,750	2,200,922	3,563,164	692,598	8,069,657	115,581	483,437	15,107,617	4,583,134	650,393	3,930,850	181,327
Washington Southern	36	272,522	313,642	799,343	94,248	122,873	10,950	331,807	15,020	24,119	599,018	200,325	26,225	174,080	—16,589
West Jersey & Seashore	356	1,210,350	2,858,656	4,476,965	731,185	675,813	104,599	1,905,906	22,223	107,383	3,547,108	929,857	228,902	700,686	84,952
Western Maryland	661	4,523,823	663,222	5,451,258	792,392	924,837	176,260	2,034,145	15,766	152,965	4,090,583	1,360,675	200,000	1,160.675	856,969
Western Pacific	943	2,767,106	744,763	3,734,053	797,053	488,083	197,702	1,264,611	86,620	167,337	3,001,407	732,647	231,597	499,766	—42,112
Western Ry. of Alabama	133	457,935	296,860	836,570	153,382	203,682	47,233	257,765	12,162	36,361	710,285	126,285	43,730	82,017	—151,843
Wheeling & Lake Erie	459	2,800,865	387.826	3,518,203	387,778	678,584	72,485	1,381,511	10,258	118,909	2,649,525	868,678	251,255	617,423	—857,608
Yazoo & Mississippi Valley	1,377	6,012,522	1,575,265	8,024,038	1,187,042	1,119,814	135,773	2,980,283	13,591	191,943	5,620,714	2,403,324	405,000	1,996,904	—640,364

Traffic News

The Erie, in co-operation with Cornell and Alfred Universities is running a farmers' demonstration train in western New York.

The date for the appearance of Illinois railroad officers before the senate and house committees on public utilities in behalf of the 2½-cent passenger fare bill has been postponed until Wednesday, April 21.

The Central of Georgia has posted in its stations notices to farmers calling on them for information concerning any surplus oats or wheat which they may be likely to have at the end of the season, the agricultural department of the road being prepared to assist, where desired, in finding nearby markets for surplus grain.

A new passenger train from St. Louis to the Pacific coast, to be called the "Scenic Limited," was put into service on April 12, over the Missouri Pacific, the Denver & Rio Grande and the Western Pacific. The train will leave St. Louis at 2 p. m. daily, arriving at Kansas City at 9:30 p. m., Pueblo, Colo., at 2:15 p. m. the following day, Salt Lake City at 1:30 p. m. the third day, and San Francisco at 5:45 p. m. the fourth.

The New York State Public Service Commission, Second district, has received notice from the principal railroads that beginning May 1 party tickets for ten or more persons traveling together will cost about 2¼ cents a mile, or 2½ mills more than at present; that the minimum charge for a special train will be increased from $50 to $75 and the minimum charge for a special car will be increased from 25 fares to 40 fares.

The Baltimore & Ohio, with a view to encouraging the exportation of coal by showing the opportunities for extending this trade as a result of the European war, is circulating a pamphlet issued by the National City Bank of New York. The pamphlet shows the tremendous proportions of the coal industry as well as the destruction of commerce and financial loss which the countries at war have suffered through the interruption of their coal trade. Coal operators in the United States have an advantage as a result of the Panama Canal route. It seems certain that coal produced in the United States can be sold profitably at Cristobal coaling station at the Atlantic end of the canal at one dollar a ton less than the price charged at Port Said station of the Suez Canal. Over 500,000,000 tons of coal was produced in this country in 1913, which was about 40 per cent of the world's output. It is estimated that all of the coal produced in the United States to the present time is about one-half of 1 per cent of the total supply of the country, which is calculated to be more than three trillion, five hundred billion tons.

Missouri Business Men Ask Help for Railroads

A large delegation of members of commercial clubs and business men's organizations held a meeting at Moberly, Mo., on April 8, in response to an invitation sent out by the Moberly Commercial Club for a conference to devise some means to assist the railroads in bettering their financial condition. Nearly 150 representative business men attended the meeting. Thirty-five went from St. Louis in a special car and 20 from Trenton in a special car. Festus J. Wade, president of the Mercantile Trust Company of St. Louis, was one of the principal speakers, and short talks were made by others, all favoring a resolution requesting the Missouri Public Service Commission to grant the request of the railroads for an increase in state freight and passenger rates. A committee was appointed to prepare resolutions to be presented to the commission.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, has issued statistical statement No. 3 giving a summary of freight car surpluses and shortages for April 1, 1915, with comparisons.

The total surplus on April 1, 1915, was 313,421; on March 1, 1915, 322,290, and on April 1, 1914, 141,525.

The surplus for March 1, 1915, shown above, includes figures reported since the issue of statistical statement No. 2 (published in the *Railway Age Gazette* of March 12, page 486).

The total shortage on April 1, 1915, was 348; on March 1, 1915, 543, and on April 1, 1914, 2,013.

The figures by classes of cars follow:

Classes	Surplus	Shortage
Box	93,400	208
Flat	19,472	50
Coal and gondola	145,069	33
Other	55,480	57
Total	313,421	348

Passes in Texas

J. H. Hill, president of the General Managers' Association of Texas, in a statement relative to the suit against 41 Texas railroads filed by the attorney general of Texas, seeking to declare unconstitutional the exceptions or exemptions of the Texas anti-pass law, says that all passes issued by the roads since the enactment of the law on July 1, 1907, have been in accordance with opinions issued by the attorney general's department interpreting the exemption section, and that since the passage of the act there has never been a prosecution for the illegal issuance of a pass. The calculations of the attorney general as to the amount of revenue the roads have lost by issuing passes, he says, are entirely fanciful and based on the violent assumption that all persons who have traveled without paying fares would have traveled to the same extent and paid fare if they had not had passes. He says the common assumption that doing away with passes has increased the revenues of the roads is not proved by the figures.

For the year ended June 30, 1908, the year following the enactment of the law, with 500 more miles of railroad, the passenger revenue of the Texas lines increased only $23,671, while according to the attorney general's statement the free travel had decreased 26.5 per cent. For the six fiscal years ended June 30, 1913, Mr. Hill says, the total mileage traveled on passes in Texas was 752,571,281, of which 71 per cent represented travel by employees and members of their families over the roads on which they were employed, and 26 per cent by officers, agents and employees of other railroads, making 97 per cent of the total traveled by railroad employees and their families. A large part of this travel was by employees in the discharge of their duties, and the rest was represented by travel for pleasure, a large proportion of which would not have taken place without the passes. About 2 per cent of the total represented travel by public officials of the state of Texas, and about one-half per cent by officials of the United States, the remaining one-half per cent representing passes issued for charitable purposes, or for other purposes allowed by the law. Since 1907, he says, the general managers of the Texas railroads have supposed that this transportation was issued under the declared policy of the state of Texas, and if they have made a mistake it has been contributed to by the action of the attorney general's department.

Traffic Through Sault Ste. Marie Canals

Lieut. Col. Mason M. Patrick, of the U. S. Army, has issued the annual statistical report of lake commerce passing through the canals at Sault Ste. Marie, Michigan and Ontario, during the season of 1914. The total freight traffic of 55,369,934 short tons for the season of 1914, when compared with the season of 1913, shows a decrease of 31 per cent, or 24,348,410 tons, and the net registered tonnage of 41,986,339 shows a decrease of 28 per cent, or 16,003,376 tons. All the items of freight show a decrease when compared with the season of 1913, except salt and copper. The total number of passengers was 59,801, a decrease of 17,393. The passages through both canals numbered 18,717, showing a loss of 5,078, or 21 per cent. The total lockages numbered 13,502, a loss of 3,365, or 20 per cent.

The season of navigation continued for a period of 7 months and 28 days, during which time the average monthly freight traffic was 6,979,403 short tons, and 5,292,396 tons net register. The mean depth of water through the canals and locks limited the safe draft to about 19 feet until after the opening of the new third lock and canal.

The traffic through the American canal was 50 per cent of the total freight, 59 per cent of the total net registered tonnage

and 50 per cent of the total number of passengers carried, the amounts being 27,771,467 tons of freight, 24,690,381 tons register and 29,792 passengers. Compared with the season of 1913, there was a decrease of 9,250,734 tons of freight, or 25 per cent; 7,372,238 tons register, or 23 per cent; and 10,704 passengers, or 26 per cent. The American canal opened April 20 and closed December 17, 1914, making the length of its season 242 days.

The traffic through the Canadian canal was 50 per cent of the total freight, 41 per cent of the total registered tonnage and 50 per cent of the passengers carried, the amounts being 27,598,467 tons of freight, 17,295,958 tons register and 30,009 passengers. Compared with the season of 1913, there was a decrease of 15,097,676 tons of freight, or 35 per cent; 8,631,138 tons register, or 33 per cent; and 6,689 passengers, or 18 per cent. The Canadian canal was opened April 20 and closed December 14, 1914, making the length of its season 239 days.

The general summary for American and Canadian canals is as follows:

Total freight carried, tons	55,369,934
Total tons net register	41,986,339
Total mile-tons	46,112,251,781
Total valuation placed on freight carried	$634,800,268
Total amount paid for freight carried	$27,597,099
Total number of registered vessels using canals	813
Total number of passages by unregistered craft carrying freight	375
Total valuation placed on registered vessels	$134,631,700
Total number of passengers transported	59,801
Average distance freight was carried, miles	832.8
Average cost per ton for freight transportation	$0.50
Average cost per mile per ton, mills	.60
Average value per ton of freight carried	$11.46
Time American canal was operated, days	242
Time Canadian canal was operated, days	239
Freight carried by—	
Registered vessels, tons	55,285,213
Unregistered vessels, tons	84,721
American vessels, per cent	91
Canadian vessels, per cent	9
Passengers carried by—	
American vessels, per cent	48
Canadian vessels, per cent	52

American Association of Passenger Traffic Officers

The sixtieth annual convention of the American Association of Passenger Traffic Officers was held at San Francisco, Cal., beginning on Thursday of this week. The program includes reports from the executive committee and the various standing committees and special committees, including the committees on adjustments of disputes relative to division of passenger fares; printing of folders and other advertising matter, and economical distribution thereof; telegraph code applicable for use in passenger traffic departments; operation of and charges for dining cars; additional charge for checking baggage; revision of joint tariffs; improved method of making sleeping car reservations; additional fare for sleeping or parlor car passengers, and additional charge for passenger occupying section in sleeper; and reports from co-operating associations. Topics for discussion under the head of new and miscellaneous business included: expense of special train service for organized party business; operation of unnecessary sleeping cars on through trains; advance in passenger fares, those made and under contemplation with an exchange of views as to conditions and progress being made; economies in operation of city ticket offices and in passenger service; improved method of handling reports of territorial committees on subjects which have been referred to them by the American Association of Passenger Traffic Officers; and relations of passenger traffic officers with the Interstate Commerce Commission and with state, railroad and utility commissions. The annual address was presented by O. P. McCarty, passenger traffic manager of the Baltimore & Ohio.

A large party of members of the association and their families left Chicago on Sunday evening, April 11, in a special train, which was practically a duplicate of the Overland Limited, the route being over the Chicago & North Western, the Union Pacific and the Southern Pacific. The itinerary provided for spending several hours at Salt Lake City enroute, and after a stop of about four days at San Francisco, where in addition to attending the convention the party will visit the Panama-Pacific Exposition, the party will proceed by special train to Los Angeles, stopping at Del Monte, Paso Robles and San Bernardino. After spending four days in Los Angeles and vicinity, including a trip to the Panama-California Exposition at San Diego, the return trip will be made from Los Angeles over the Atchison, Topeka & Santa Fe, a stop of one day being made at the Grand Canyon, and the party will arrive at Chicago on April 29.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Rates on Coal to St. Paul and Minneapolis

Daly Coal Company et al. v. Chicago & Alton et al. Opinion by Commissioner Clements:

The commission finds that the rates, increased ten cents a ton on May 30, 1914, on bituminous coal from mines in Illinois and Indiana to St. Paul and Minneapolis, Minn., are not unreasonable. (33 I. C. C., 467.)

Minimum Weight on Calves

Irvin Kibbe v. Abilene & Southern et al. Opinion by Commissioner McChord:

The commission finds that the minimum carload weight of 22,000 lb. on calves from Greta and other Texas shipping points to points in Colorado, Kansas, Illinois and other states is discriminatory against such points of origin. A minimum of 17,000 lb. is prescribed for the future. (33 I. C. C., 415.)

Rates on Corrugated Galvanized Sheet Iron to Pacific Coast Points

California Corrugated Culvert Company v. Alabama Great Southern et al. Opinion by the commission:

It is found that a rate of 95 cents per 100 lb. on corrugated galvanized sheet iron in carloads from Middletown, Ohio, to Pacific coast points is reasonable, but that it is discriminatory in that it exceeds the rate of 85 cents between the same points on plain galvanized sheet iron. No reparation is awarded. (33 I. C. C., 445.)

Rates on Grain Between Points in Oklahoma and Kansas

Opinion by Commissioner Harlan:

The commission finds that the carriers have not justified a proposed cancellation of joint rates on grain and grain products moving from points on the line of the Chicago, Rock Island & Pacific in Nebraska and Kansas to points in Oklahoma on the St. Louis & San Francisco. Had the joint rates been cancelled rates equal to the sum of the intermediate rates would have applied which would have been from one-half cent to 13½ cents per 100 lb. higher than the rates at present in effect. (33 I. C. C., 452.)

Joint Fares with the Grand Rapids, Grand Haven & Muskegon

Howard P. Damon et al. v. Crosby Transportation Company et al. Opinion by Commissioner McChord:

The commission finds that the Crosby Transportation Company in selling through tickets via its boats and the line of the Detroit, Grand Haven & Milwaukee, between Milwaukee, Wis., and Grand Rapids, Mich., and refusing to sell through tickets between the same points via the line of the Grand Rapids, Grand Haven & Muskegon, discriminates against the latter. The Detroit, Grand Haven & Milwaukee is a subsidiary company of the Grand Trunk, and the Grand Rapids, Grand Haven & Muskegon is an electric line which parallels it. (33 I. C. C., 448.)

Railroad Ownership of The Dalles, Portland & Astoria Navigation Company

In re Spokane, Portland & Seattle's ownership of the Dalles, Portland & Astoria Navigation Company. Opinion by Commissioner Clark:

The Spokane, Portland & Seattle operates a line from Portland, Ore., to Spokane, Wash. From Portland to Pasco, Wash., it follows the north bank of the Columbia river, and for substantially the same distance is paralleled by the main line of the Oregon-Washington, which follows the south bank. The railway is the sole owner of the stock of The Dalles, Portland & Astoria Navigation Company, which owns and operates two

steamboats on the Willamette and Columbia rivers between Portland and Dalles, Ore., a distance of approximately 95 miles. The route from Portland is down the Willamette river, 12 miles to its mouth, and thence up the Columbia river, paralleling the rail line of the petitioner.

The commission finds that the navigation company does and may compete with the rail line within the meaning of section 5 of the Panama Canal Act.

It was shown that attempts had been made at different times to operate independent boats between Portland and The Dalles, but that with the exception of a single boat, now in operation, all had failed. It was admitted that so long as the boats of the navigation company were operated, it would be impossible for another boat line to exist on this route. What is known as the lower Columbia river is navigable only from Portland to Celilo, Ore., a point 11 miles above The Dalles. The Celilo canal, which is being constructed by the United States government, will, however, permit boats to pass from the lower to the upper river, and will allow navigation even up to Pasco. An attempt had already been made by an independent company to operate boats above Celilo in connection with boats below, but this attempt also had failed. The commission believes that it is clear from the record that through water transportation cannot be established or maintained between the upper and lower rivers so long as the Spokane, Portland & Seattle owns or controls the navigation company. It was shown that new capital could not be secured to establish and operate a boat line in competition with a railroad-owned boat line, and that a through line could not profitably operate unless it could secure a certain amount of the traffic in the lower river, particularly the passenger traffic.

The commission holds that the continued ownership by the petitioner of The Dalles, Portland & Astoria Navigation Company would not be in the interest of the public and of advantage to the convenience and commerce of the people, and that it would exclude, prevent or reduce competition on the water route here considered. The railway will not be allowed to continue its ownership of the navigation company after June 1, 1915. (33 I. C. C., 462.)

Carriers Should Waive Demurrage at Galveston

E. E. Clark, of the Interstate Commerce Commission, has rendered an opinion on the controversy between the railroads and shippers regarding the assessment of demurrage at Galveston on grain for export, which grew out of the accumulation of demurrage charges on account of the difficulty of obtaining boats last summer. A conference of the parties was held before the commission at Washington on March 25. The carriers reaching Galveston last summer established tariffs providing for the collection of demurrage at Galveston on grain for export. On the breaking out of the war the exporters were disappointed in getting ships to take the grain from Galveston, and the embarrassment was further accentuated by the burning of a large elevator at Galveston in November. A considerable congestion of export grain ensued, accompanied by the accrual of a very large amount of demurrage. The Galveston commercial interests had insisted that it is unjustly discriminatory against the port of Galveston for the carriers to assess demurrage on export grain at that port, so long as similar assessment was not provided for at the port of New Orleans. Mr. Clark said that under the circumstances the tariff should be cancelled, the earlier the better, and the commission will permit such cancellation on one day's notice. He also expresses the opinion that under the circumstances it would be just and proper to relieve the shippers and exporters from the obligation to pay the demurrage accrued and accruing on this export grain, but that this should be done in a lawful and proper manner, that the carriers should present to the commission formal request for authority to waive the collection of these demurrage charges upon the ground that in normal times the carrier would not deem it proper to assess such demurrage at Galveston while none is assessed at New Orleans, and because of the difficulties created by the war. "I do not deem it at all necessary," he said, "that the carriers should admit that the principle of demurrage on export grain is wrong or a mistaken one. The request should be considered in the light of unusual and unprecedented circumstances."

STATE COMMISSIONS

The Texas Railroad Commission on May 3 will resume its hearings on the application of the railroads in the state for 15 per cent advance in freight rates.

The Arkansas Railroad Commission last week refused to accept and file the tariffs received from the St. Louis & San Francisco, putting into effect three-cent passenger rates on that road in Arkansas, following the decision of Judge Trieber of the United States district court holding the two-cent fare law confiscatory. The commission announced that it would appeal from the decision to the United States Supreme Court, and that pending the appeal the three-cents-a-mile tariff would not be accepted.

A hearing on the application of the Kansas railroads for increases in their freight and passenger fares was begun before the Kansas Public Utilities Commission last week. The first witness was James Peabody, statistician for the Atchison, Topeka & Santa Fe. He presented statistical exhibits making a division of expenses between freight and passenger service and line and terminal expenses to show that the railroads are losing money on passenger service. He also showed that the handling of traffic on local trains was more expensive than on through trains. W. J. Black, passenger traffic manager for the Atchison, Topeka & Santa Fe, also testified.

The New York Public Service Commission, second district, holds that a paper package need not be received as baggage, no matter how well it may be disguised with a cardboard suitbox inside the paper, and straps and cords and handles outside. The complainant in the case was a woman, Sara W. Lyons, and the New York Central was the road which refused to check her package. In its order the commission tells of the necessarily rough handling that baggage must be subjected to. Not knowing the contents of paper packages, the railroad contended that its baggagemen would have to handle such material much more slowly and carefully than that in leather or other stronger containers. The commission recognizes the right of the railroad to require that baggage be enclosed in substantial containers. Adequate protection is not afforded by the paper-wrapped cardboard box.

PERSONNEL OF COMMISSIONS

Joseph L. Bristow, formerly United States senator from Kansas, has been appointed chairman of the Kansas Public Utilities Commission, succeeding C. F. Foley. Mr. Bristow was born in Wolfe county, Kentucky, on July 22, 1861. He was clerk of the district court of Douglas county, Kansas, from 1886 to 1890, and for the next five years was owner and editor of the Salina (Kansas) Daily Republican, from 1895 to 1905 of the Ottawa (Kansas) Herald, and since 1903 he has been owner and editor of the Salina Daily Republican Journal. He was private secretary to Governor Morrill of Kansas from 1895 to 1897, fourth assistant postmaster general from 1897 to 1905, and secretary of the Republican state committee from 1894 to 1898. In 1900 he had charge of the investigation of Cuban postal frauds and the reorganization of the Cuban postal service, and in 1903 he conducted the postal investigation under the Roosevelt administration. In 1905 he was special commissioner of the Panama Railroad, and in 1909 he was elected United States senator from Kansas, serving one term, which expired this year.

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J. L. Bristow

COURT NEWS

In the United States district court at Cairo, Ill., on April 6, the Mobile & Ohio was fined $900 for violation of the federal quarantine restricting the transportation of cattle.

The Supreme Court of the United States, in a decision handed down this week, has annulled as arbitrary and unconstitutional the statute of Wisconsin, adopted in 1911, providing that if four or more passenger trains are run each way daily (except Sundays) by a railroad, at least two of them shall be stopped at every postoffice village having 200 inhabitants.

The Supreme Court of Illinois has granted a motion of the Illinois Public Utilities Commission for permission to file a petition for mandamus to compel the Chicago & North Western to comply with an order of the old railroad and warehouse commission. The question involved is whether the orders of the old commission can be made effective by the public utilities commission which succeeded it.

The United States District Court at Huntsville, Ala., has dismissed 34 suits against the Louisville & Nashville for damages based on the charge of neglect in the transportation of cotton at the time of the notorious Knight-Yancey bill-of-lading frauds several years ago. These suits were brought by cotton brokers in England, Germany, France and Italy. A suit against the road brought by the National Park Bank of New York City is still pending in the court of Morgan county, Ala.

Reconsignment Charge—Shipper Must Prove Damage

The Circuit Court of Appeals for the Second Circuit holds that though a carrier was guilty of discrimination in making a reconsignment charge of $2 at a point where the plaintiff reconsigned hay, while it permitted reconsignment free at another point, this did not necessarily entitle the plaintiff to recover $2 per car as damages, in the absence of proof that he in fact suffered the loss. It was not enough to show that various items of $2 had been paid; for aught that appeared the money may have come out of the ultimate buyers. Without affirmative proof to show damages, the hay company was not entitled to a verdict. (Lehigh Valley v. American Hay Co., C. C. A., 219 Fed., 539.)

Twenty-Eight Hour Law—Separate Offenses

Ten separate actions brought by the government against the Oregon Short Line, for violations of the 28-hour law, turned upon the two following questions: (1) If a carrier confines animals in a car for more than the time named in the statute (28 or 36 hours, as the case may be), and thereupon puts them into pens of inadequate size and insufficiently equipped for feeding and watering, is it guilty of two offenses? and (2), if the carrier consolidates into the same train consignments loaded at different times, and thereafter, before the expiration of the period of 28 hours, unloads the entire train into pens of insufficient capacity and without proper facilities for feeding and watering, does it commit more than one offense?

The Federal District Court of Idaho, S. D., considered that both questions might be referred to one controlling consideration, whether the mere unloading of stock into inadequate pens, of itself, constitutes an offense. The act of Congress does not prescribe at what points stock pens shall be maintained, or how they shall be equipped. The carrier may fully comply with its terms without any pens at all. The offense consists in confining the stock beyond the period of 28 hours without feeding, etc. The confinement does not constitute an offense until it passes the prescribed limit. The holding of stock in unfit pens is equivalent to holding them in cars which are deficient in similar particulars. The court held that in unloading stock into improperly equipped pens, after they have been confined in transit without food and water for more than 28 hours, the carrier only continues and aggravates the offense; it does not commit a new one. In effect, the confinement in the cars is deemed to continue until the stock are unloaded into suitable pens and there fed, watered and rested. But where consignments, unloaded simultaneously, were received by the carrier at different hours, the unlawful confinement of each consignment constituted a separate offense. (United States v. O. S. L., 218 Fed., 868.)

Railway Officers

Operating

P. F. McManus, superintendent of the Joliet division of the Elgin, Joliet & Eastern, has been appointed general superintendent, with headquarters at Joliet, Ill., and his former office has been abolished.

D. S. Brigham has been appointed trainmaster of the Boston & Albany, with office at Beacon Park, Mass., vice Sheridan Bisbee, promoted to fuel supervisor in charge of all matters pertaining to the use of fuel, with headquarters at Boston.

Traffic

F. L. Word, having been assigned to other duties, the office of live stock freight agent at Atlanta, Ga., has been abolished on the Southern Railway, the Virginia & Southwestern, the Georgia Southern & Florida, the Hawkinsville & Florida Southern and the Macon & Birmingham.

T. B. Montgomery, general agent of the Chicago, Milwaukee & St. Paul, at Pittsburgh, Pa., has been appointed assistant general freight agent, with headquarters at Minneapolis, Minn., succeeding F. E. Otis, deceased, and E. H. Spence succeeds Mr. Montgomery as general agent at Pittsburgh.

W. H. Tayloe has been appointed passenger traffic manager of the Southern Railway, the Virginia & Southwestern and the Northern Alabama, with office at Washington, D. C., vice S. H. Hardwick, who has resigned the office of passenger traffic manager, on account of ill health, and has been appointed general agent, passenger department, with office at Montgomery, Ala.

Gerrit Fort, whose appointment as passenger traffic manager of the Union Pacific System, including the Oregon Short Line and the Oregon-Washington Railroad & Navigation Company, with headquarters at Chicago, has already been announced in these columns, was born November 12, 1865, at Cedar Rapids, Iowa. He began railway work in the fall of 1884 as clerk to the superintendent of the Burlington, Cedar Rapids & Northern at Cedar Rapids. From January, 1887, to September, 1889, he was clerk to the auditor of the Wabash at Chicago under the receivership; was then for two years assistant rate clerk in the general passenger department of the New York Central & Hudson River at New York, and from September, 1891, to January, 1897, was chief clerk of that department. He left the New York Central to become secretary of the Central Passenger Association at Chicago, resigning in September, 1900, to go to the Union Pacific as assistant general passenger agent. Mr. Fort returned to the New York Central Lines in June, 1907, as assistant to the vice-president, and in February, 1910, he was made general passenger agent of the lines east of Buffalo. In July of that year he again entered the service of the Union Pacific as passenger traffic manager, with office at Omaha, Neb. His jurisdiction was extended over the Oregon Short Line in December, 1910, and on April 1 he was appointed also passenger traffic manager of the Oregon-Washington Railroad & Navigation Company, and his headquarters removed to Chicago, as above noted.

Gerrit Fort

F. R. Perry, general agent of the passenger department of

the Canadian Pacific at Boston, Mass., has been transferred in the same capacity to New York, succeeding W. H. Snell, promoted, and E. F. L. Sturdee, assistant district passenger agent at Toronto, Ont., succeeds Mr. Perry.

J. L. Burnham, division freight agent of the Northern Pacific at St. Paul, Minn., has been appointed assistant general freight agent; L. R. Capron has been appointed assistant general freight agent, and W. A. Cleland has been appointed division freight agent; all with headquarters at St. Paul. J. C. McCutchen has been appointed general agent of the freight department at Milwaukee, Wis., vice C. T. Noonan, deceased.

Engineering and Rolling Stock

J. M. Kerwin has been appointed general foreman, locomotive department, of the Rock Island Lines, at Cedar Rapids, Iowa, in place of M. B. McPartland, transferred.

V. E. Hunter has been appointed general foreman of the Texas Midland, with headquarters at Terrell, Texas, succeeding A. C. Miller, whose title was master mechanic.

George A. Butler has been appointed acting assistant engineer of the Belleville division of the Grand Trunk, with headquarters at Belleville, Ont., vice C. S. Ogilvie, who has enlisted for active service abroad.

Purchasing

Major Charles E. Dole, assistant purchasing officer of the Panama Isthmian Canal Commission, has been appointed purchasing officer of the Alaskan Engineering Commission, with headquarters in the Alaskan building, Seattle, Wash. This is the board that will build the government railroad in Alaska.

Edward J. Roth, whose appointment as purchasing agent of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, has already been announced in these columns, was born on March 4, 1882, at Rochester, Minn. He began railway work with the Chicago, Burlington & Quincy, in 1902, and was employed in the store department of that road until April, 1914, at that time holding the office of assistant general storekeeper. He then went to the Chicago, Indianapolis & Louisville, as supply agent, which position he held until his recent promotion to purchasing agent, as noted above.

OBITUARY

Henry L. Millis, manager of the Western Livestock Express, Chicago, died at his home in Chicago on April 2.

James McGee, master mechanic of the Lorain, Ashland & Southern, with headquarters at Ashland, Ohio, died at his home in Lorain on April 6, aged 56 years.

M. C. Roach, superintendent of the New York division of the Lehigh Valley, with headquarters at Jersey City, N. J., died on April 12, at his home in Passaic, N. J., at the age of 46.

David James Mackey, formerly from 1881 to December, 1892, president of the Evansville & Terre Haute, died on April 9 at Evansville, Ind., aged 82 years. Mr. Mackey was president also of the Louisville, Evansville & St. Louis from April, 1889, to 1894.

Henry W. Poor, president of Poor's Railroad Manual Company, died at his home in New York City, April 13, at the age of 71. He was a director of the Missouri, Kansas & Texas; and, as a banker, had other important railroad interests; but he is best known to readers of the *Railway Age Gazette* by his connection with Poor's Manual of Railroads, a name which has been a household word in railroad offices for nearly half a century. He was born in Bangor, Me, his father being Henry V. Poor, who was editor of the American Railroad Journal (now the Mechanical Edition of the *Railway Age Gazette*), from which he retired in 1863. Henry W. Poor was graduated from Harvard College in 1865, and in 1868 became a partner with his father in the banking firm of H. V. & H. W. Poor; and in that year the first number of the Manual was issued. This annual publication, still an essential part of the equipment of the railroad officer's library, was, until the establishment of the statistical office of the Interstate Commerce Commission, in 1887, of still more importance than now; for it was the only source of detailed information concerning the financial affairs and history of the railroads of the United States.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for one second hand 45-ton six-wheel switching locomotive and one second hand 70-ton Consolidation type locomotive.

CAR BUILDING

THE VIRGINIAN RAILWAY is in the market for 500 underframes.

THE WILKESBARRE & HAZLETON is in the market for 10 coaches.

THE NEW YORK MUNICIPAL is asking for bids on 100 more steel subway cars.

THE PENNSYLVANIA LINES WEST are inquiring for 150 underframes for cabooses.

THE WESTERN MARYLAND is contemplating the purchase of a number of passenger cars.

THE CHICAGO & NORTH WESTERN is reported to be in the market for 2,500 freight cars and 50 passenger cars.

THE PONCA REFINING COMPANY, has ordered 100 tank cars from the American Car & Foundry Company.

THE NEW YORK, WESTCHESTER & BOSTON has ordered 15 multiple unit passenger coaches from the Pressed Steel Car Company.

IRON AND STEEL

THE SOUTHERN has ordered 3,700 tons of steel rails from the Tennessee Coal, Iron & Railroad Company.

THE GOVERNMENT RAILWAYS OF THE UNION OF SOUTH AFRICA have ordered 30,000 tons of steel rails from the Dominion Iron & Steel Company.

THE PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS has ordered 767 tons of steel for a bridge over its tracks at West Lake street, Chicago, from the Chicago Bridge & Iron Company.

COAL CAR SHORTAGE IN NEW SOUTH WALES.—Colliery managers in the neighborhood of Sydney are complaining of damage to trade caused by a shortage of railway cars. Only a short while ago some of the pits were idle, although orders were plentiful. One colliery was operated but 14 hours in two weeks.

IRISH RAILWAYS' WAR BONUS.—Trouble has arisen over the claim that Irish railwaymen of the wages staff should receive the same war bonus as has already been granted by arrangement with the government on English and Scottish railways. That arrangement includes adult wage-earning employees in the grades embraced in the conciliation scheme, a bonus of 3s. (75 cents) a week being granted where the wages are under 30s. ($7.50) a week, and of 2s. (50 cents) a week where the wages are 30s. and over. The position of the railways in Ireland is peculiar as they are neither parties to the conciliation scheme, nor under government control. In answer to appeals from their employees for some concession to meet the increased cost of living, individual companies voluntarily gave assistance some weeks back. The Great Northern, Midland (Northern Counties Committee), and Belfast & County Down have sanctioned allowances varying from 2s. to 1s. a week to all permanent adult members of their staffs, while the Great Southern & Western allowances are 1s. 6d. and 1s., and the Dublin & South-Eastern is allowing 1s. a week in many cases. The difficulty in which the Irish companies are placed is that they have no government subsidy, and their circumstances vary so much that they cannot be treated as a unit for the purpose of fixing a uniform bonus.

Supply Trade News

Merrill G. Baker has been appointed assistant general manager of sales of the American Vanadium Company.

A. Munch, who has been factory manager of the Maywood, Ill., plant of the Hewitt Company, Chicago, has been appointed to the new position of service engineer for the same company.

The Chicago Pneumatic Tool Company, Chicago, has moved its New York office from 50 Church street to 52 Vanderbilt avenue, and its Boston office from 191 High street to 185 Pleasant street.

Edwin S. Jarrett, formerly vice-president of the Foundation Company, New York, and Ralph H. Chambers, formerly chief engineer and general manager of the same company, have formed the Jarrett-Chambers Company, Inc., contractors, with offices at 30 East Forty-second street, New York.

Announcement was made in this column last week that the annual meeting of the former employees of the New York Central Signal department would be held at the Hotel Astor in New York on May 26. It is now announced that this date has been changed to May 27.

Charles R. McCormick & Co., manufacturers and cargo shippers of creosoted lumber, ties and piling, with main office at San Francisco, Cal., and mills, creosoting plant and ship yards at St. Helens, Oregon, have opened an office at 17 Battery place, New York, with C. E. Bland as New York manager.

The Reliance Equipment Company, Inc., Mobile, Ala., has been incorporated in that city, and has opened offices at 112 N. Water street. The company will solicit railway business in Alabama, Mississippi, Florida and Louisiana, and will specialize in rails, track tools, equipment, waste and general supplies for railway machine shops. The president of the company is James H. Zelnicker, and the vice-president and secretary, William J. Zimmern.

Judge George H. Bingham in the United States Court for the district of Massachusetts at Boston, handed down a decision on March 13, 1915, sustaining the validity of patent No. 741,385, owned by the Terry Steam Turbine Company, Hartford, Conn., which has been involved in the suit entered about two and one-half years ago by it against the B. F. Sturtevant Company, Hyde Park, Mass. The suit alleged that the B. F. Sturtevant Company was building a steam turbine which infringed this Terry patent.

The Canadian Car & Foundry Company is reported to be working on an order for shrapnel and other ammunition for Russia said to amount to $80,000,000, of which $20,000,000 has already been advanced. A part of this business has been let to American companies. The Westinghouse Electric & Manufacturing Company and the American Rolling Mill Company, Middletown, Ohio, are also reported working on orders for shrapnel. The Westinghouse Air Brake Company is reported to have received an order for 1,000,000 shrapnel, valued at $20,000,000 from France.

The receivers of the United States Light & Heating Company, Niagara Falls, N. Y., announced to Judge Hazel of the United States District Court of the Western District of New York in Buffalo on March 30 that a complete reorganization of the company was now assured through the efforts of the stockholders protective committee which represents a controlling share of the preferred and common stock. The proposed reorganization plan was given in this column last week. The receivers have made application advising Judge Hazel to wind up the receivership and transfer the business and the property to the reorganized company. It is understood that necessary notification to the stockholders and others will take some time and that the receivership will probably not be discontinued before some time in June. The plant at Niagara Falls has been doing a larger volume of business during the last two months than for a year past and orders booked for future deliveries are considered very satisfactory. The receivers of the company are James A. Roberts, of New York; James O. Moore, of Buffalo, N. Y., and J. Allan Smith, of Niagara Falls, N. Y.

J. W. Cowper and F. D. Huntington announce the incorporation of the John W. Cowper Company, Inc., engineers and contractors, with office in the Fidelity building, Buffalo, N. Y. It is the purpose of the company to execute complete contracts in building construction. Mr. Cowper was for a number of years engineer of maintenance of way on the Cleveland, Cincinnati, Chicago & St. Louis. From 1900 to 1904 he was with James Stewart & Co. as superintendent of construction on the British Westinghouse plant at Manchester, England, and other structures in Great Britain, including the Savoy hotel in London and the Midland hotel in Manchester. He was then with the same firm for several years in this country, and for the last six years has been vice-president of Worden-Allen & Company, Milwaukee, Wis., and the Lackawanna Bridge Company, from which positions he resigned on April 1. Mr. Huntington, the other member of the company, graduated from Cornell with the class of 1900. He was originally with Westinghouse-Church-Kerr & Company. He also was connected with James Stewart & Co., in England and this country, and later was general superintendent and manager of the Warring, White Company, London. For a time he was in charge of building construction on the Brazil Railway at Rio de Janeiro, this latter engagement lasting until the beginning of the war last fall.

Edward N. Hagar, of Chicago, formerly president of the Universal Portland Cement Company, who resigned from that corporation about two months ago for the purpose of organizing a new cement combination, has recently said with reference to the proposed company that, "The company will be capitalized not in excess of $25,000,000, with a possible minimum of $20,000,000. The stock will be all of one class. There will be no bonded indebtedness. Should the company require additional working capital or money for plant extensions in the future, that will be provided out of earnings. The object of the company is to establish a chain of plants over the country. These plants will be obtained by purchase where practicable, or by building where necessary. For years the cement industry has been hampered as a result of freight rates. Manufacturers have been unable to handle business, successfully in territory beyond a radius of 150 or 200 miles from their plants. The present plan involves what may be termed a 'coast-to-coast' cement company, with plants located at advantageous points throughout the country. The entire country will be divided into territories which may be described within circles, each circle touching the adjacent circles, with a plant as near to the center of the circle as possible. In this way the company will be enabled to overcome the hampering cost of freights for long distances and will be enabled by reason of the magnitude of the output, to compete successfully with any other producer of cement."

TRADE PUBLICATIONS

Electric Railway. Light and Power Materials.—The Drew Electric & Manufacturing Company, Indianapolis, Ind., has recently issued catalog No. 3, a 208-page book devoted to illustrations and descriptions of electrical fixtures and construction materials. The book also gives the prices of the various apparatus.

Boiler Makers' Tools.—A 40-page catalog has recently been issued by the J. Faessler Manufacturing Co., Moberly, Mo., which is devoted to the general line of boiler makers' tools manufactured by this company together with special flue cutting and countersinking tools. The catalog is well illustrated and contains price lists as well as information concerning the operation of the various tools.

Forging Hammers.—Catalog No. 66 of the Chambersburg Engineering Co., which has just been issued, is devoted to a representative line of the different types of steam hammers manufactured by this company. This is a 64-page, 8½-in. by 11-in. catalog in which the features of Chambersburg hammers are described in some detail. It contains a complete index of machinery built by this company, including equipment not shown in this catalog as well as the line of hammers which the catalog covers. It is exceptionally well illustrated.

Railway Construction

Canadian Pacific.—On the Kettle Valley Lines, which is building extensions in British Columbia, the section from Midway, B. C., via Penticton and Princeton, to a junction with the Nicola sub-division of the Canadian Pacific at Merritt, 272 miles, and with the main line at Spences Bridge, 312 miles, is expected to be open for passenger traffic in June; the section from Mons Junction southwest to Hope will not be completed until 1916. The opening of the Kettle Valley Lines will give the Canadian Pacific another alternative route to and from the Pacific coast, by way of the Crowsnest Pass, Kootenay Landing, Nelson, Midway, Penticton, Princeton and Spences Bridge, and the distance between Winnipeg, Man., and Vancouver, B. C., via this new route will be 1,811 miles, as compared with 1,484 miles via the main line through Calgary and Banff, and 1,657 miles via Dunmore Junction, Crowsnest, Kootenay Landing, West Robson and Revelstoke.

Chester & Lancaster (Electric).—Residents of Joanna, Pa., are said to be back of a project to build a high speed electric railway from Blue Ball, Pa., east via Churchtown and Elverson to Phoenixville, about 35 miles. Jacob Hartz, Blue Ball, is said to be interested.

Erie & Southwestern (Electric).—Organized in Pennsylvania, it is said, by residents of Erie, Pa., to build an electric line from Erie, southwest via Weis Library, Sterretania, Platea, Cranesville, Albion, Springboro, Conneautville and Exposition Park to Conneaut Lake, about 40 miles. Surveys for the line have been made. H. C. Allen, Erie, may be addressed.

Furman & Yemassee.—Incorporated in South Carolina with $10,000 capital and headquarters at Furman, S. C. The plans call for building from Furman, on the Southern Railway, east via Grays to Yemassee on the Atlantic Coast Line and the Charleston & Western Carolina, about 22 miles. J. H. Adams, W. P. Ellis and H. Weindal are said to be interested.

Kettle Valley Lines.—See Canadian Pacific.

Long Island.—The report of this company for the year ended December 31, 1914, shows that work was continued on the tunnel section at East New York of the Bay Ridge improvement, and it is expected that all the work will be completed during 1915, except the yard, float bridges, etc., at Bay Ridge, which are to be finished before the New York Connecting Railroad is completed, and connection made with that railroad at Fresh Pond junction. The New York Connecting will be completed by the end of 1916. Very little construction work was carried out on the Jamaica improvement during the year, and there yet remains work to finish this improvement, consisting of completing tunnels under tracks, passenger storage tracks and freight tracks; also, street paving, sewers, etc. The North Side division improvement, including the elimination of grade crossings, laying of second track and the electrification of lines, has been completed. It is planned to complete work on the Woodside-Winfield cut-off in 1915. This will eliminate a number of grade crossings, besides improving the alinement by cutting out 150 degrees of curvature. Some progress was made in the elimination of grade crossings at Bushwick Junction and a settlement as to the grade line through Hollis and Queens was agreed upon with the authorities. This work and the elimination of crossings through Richmond Hill will be started the latter part of 1915, if financial conditions permit. A new passenger platform and shelter was built at Hunters Point avenue, on the tracks leading to Long Island City, and new stations were built and put in operation during the year at Murray Hill, at Holtsville and at Dunton.

Louisiana Roads (Electric).—A company is being organized in Louisiana, it is said, to build an interurban line from Rayville, La., to a point 22 miles south. T. J. Coenen, president, Progressive League, Rayville, is said to be interested.

New York Subways.—The New York Public Service Commission, First district, opened bids on April 9 for the construction of Section No. 4 of Routes Nos. 4 and 36, which includes the part of the Broadway subway in the borough of Manhattan in Seventh avenue between Fifty-first and Fifty-ninth streets. The lowest bidder was the Litchfield Construction Company, Brooklyn, N. Y., who offered to do the work for $1,937,509.

Oneida & Western.—This company, which started work about two years ago on a line from Oneida, Tenn., northwest, has eight miles of track laid and open for freight service. The route as projected for the first 15 miles is along Pine creek to its affluence with the Big South fork of the Cumberland river nine miles, thence along that river for 2.5 miles, and then up White Oak creek. The work is heavy, involving the handling of between 15,000 and 20,000 cu. yd. to the mile, and about 80 per cent is solid rock work. The maximum grade will be 2 per cent and the maximum curvature 20 deg. There will be six steel bridges on the line aggregating 595.5 ft.

Virginian Railway.—Surveys have been made to build a 6-mile line from Stone Coal Junction, W. Va., to mines on Stone Coal creek, but the company is not yet ready to carry out the construction work.

Bids were asked for recently by the Virginian Railway for the construction of the Devils Fork branch from mile post 7.5 on the Winding Gulf branch, and extending about 1.16 miles up Devils Fork in West Virginia. The company expects to let contracts for this work about April 16.

RAILWAY STRUCTURES

Chicago, Ill.—The Pittsburgh, Cincinnati, Chicago & St. Louis has awarded a contract for the steel for a bridge over its tracks at West Lake street, to the Chicago Bridge & Iron Company.

Columbia Cross Roads, Pa.—The Pennsylvania Railroad is now having repairs made to three small bridges on the Elmira division, and is also installing new superstructures. One of the bridges is near Columbia Cross Roads and the other two bridges are in Lycoming county.

Philadelphia, Pa.—The following bridges have been authorized by ordinance, to be built in Philadelphia, and bids for the work will be asked for in the near future. At Fifth street over four tracks of the North Pennsylvania Railroad, to be 70 ft. wide and cost about $70,000; at Diamond street over six tracks on the Connecting Railway, to be 60 ft. wide and cost $75,000; at Cambria and "A" streets over 13 tracks of the Richmond branch of the Philadelphia & Reading, to be 52 ft. wide and cost $62,000, all are to be skew bridges with steel floors, and concrete substructures and encasements. At Fifty-eighth street a 60 ft. reinforced concrete arch, 30 ft. wide to cost $18,000 is to be built over the Baltimore Central, and at Whitby avenue a bridge 80 ft. wide with steel floor and concrete substructure and encasement to cost $42,000 will be built over four tracks of the Baltimore Central. There will also be constructed at Third street, under two tracks of the Philadelphia & Newtown Connecting Railroad a steel superstructure to be 50 ft. wide, with concrete abutments to cost $32,000, and at Fisher avenue under two tracks of the North Pennsylvania Railroad, a steel superstructure with concrete abutments to cost $32,000.

Pittsburg, Pa.—The Baltimore & Ohio has decided to eliminate the Liberty avenue grade crossing in Pittsburgh at a cost of $750,000. Bids for carrying out the work will probably be asked for in the near future.

Spartanburg, S. C.—Contracts have been given by the Southern Railway to M. M. Elkan, Macon, Ga., and R. B. Tufts, Norfolk, Va., to construct a passenger subway under the tracks at the Spartanburg station. The subway will be 30 ft. wide, and will extend 110 ft. from the outside of the station building. It is expected that the work will be completed in six months.

Stonington, Conn.—The New York, New Haven & Hartford and the town of Stonington will jointly build a pony truss span over the tracks of the N. Y. N. H. & H., with deck I beam approach span at a point 1.5 miles west of Stonington on the Providence division. The bridge is to be of steel construction on concrete supports with wooden floors, and will require about 50 tons of steel. The cost of the bridge is $6,500, and of the approach $5,500. Contracts for the work have not yet been let.

Railway Financial News

Atlanta, Birmingham & Atlantic.—A committee, consisting of George C. Clark, S. L. Schoonmaker, Percy R. Pyne and R. G. Fessenden, has been formed, and asks the deposit of the $5,761,000 joint Atlantic & Birmingham Construction Company and Atlanta, Birmingham & Atlantic Railroad collateral 5 per cent notes due May 1. The railroad has been sold under foreclosure, but is still being operated by a receiver.

Chicago, Rock Island & Pacific.—See editorial comment and account of the stockholders' meeting in other columns of this issue.

Memphis Railway Bridge & Terminal.—This company, which is controlled by the St. Louis, Iron Mountain & Southern, the St. Louis Southwestern and the Chicago, Rock Island & Pacific, and is to build a bridge across the Mississippi river at Memphis, has been given permission by the Missouri Public Service Commission to issue $7,500,000 5 per cent bonds.

Missouri, Kansas & Texas.—Holders of the $19,000,000 2-year 5 per cent secured notes of the Missouri, Kansas & Texas, which mature on May 1, 1915, are asked to extend these notes for one year at 6 per cent interest. Holders of a majority of the notes have already agreed to this extension. Noteholders are asked to deposit their notes before April 26 with the Central Trust Company, New York. It is also announced that a committee of the board of directors, consisting of Horace E. Andrews, George W. Davison, Lewis B. Franklin, A. J. Miller and Frank Trumbull, have been appointed by the board to work out a plan for a readjustment of the financial position of the company. In the notice to noteholders Mr. Trumbull, chairman of the board, says:

"The present emergency is not due to lack of earning power, as the property is showing increases both in gross and net earnings and a surplus over all fixed charges, but is due to the maturing at an unfavorable time of this large amount of capital obligations. Any plan necessarily involves action by the stockholders of the company, in order to provide for the payment of the notes and the consequent protection of their interest in the property. It has been impossible to work out a definite plan in time for submission to the stockholders at their recent annual meeting, as a large proportion of the stock is held abroad and foreign holders could not be consulted in time.

"The committee is proceeding diligently and hopes to make an announcement at an early date. The plans under consideration contemplate an issue, to be offered to stockholders, of securities carrying a contingent charge or of preferred stock, which latter has only become practicable through the enactment by the Kansas legislature of an act shortly to become effective authorizing such issues upon consent of the holders of three-fourths of the stock."

Missouri Pacific.—Directors have asked the holders of the $24,845,000 3-year 6 per cent secured notes which were due June 1, 1914, and extended to June 1, 1915, to further extend these notes with the same collateral and at the same rate of interest to June 1, 1916. An announcement was made by George Gould that he had not agreed to extend his notes or those of the Gould estate, but had the matter under consideration.

New York, New Haven & Hartford.—A syndicate, composed of J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, and Kidder, Peabody & Company and Lee, Higginson & Company, both of Boston, has bought $27,000,000 one-year 5 per cent collateral notes of the New York, New Haven & Hartford, secured by the following collateral:

98,132 shares Old Colony 7 per cent stock at 150	$14,719,800
9,551 shares Providence & Worcester 10 per cent stock at 200	1,910,200
5,246 shares Boston & Providence 10 per cent stock at 230	1,206,580
4,867 shares Providence, Warren & Bristol 6 per cent stock at 120	584,040
971 shares Norwich & Worcester 8 per cent preferred, at 150	145,650
291,622 shares Ontario & Western at 26	7,582,172
$1,500,000 Central New England 1st 4s at 75	1,125,000
$13,000,000 Harlem River & Portchester debenture 5s at 100	13,000,000
Total	$40,273,442

The receipts from the sale of this note issue will be used to pay off $30,000,000 notes, falling due on May 1. These notes are $20,000,000 New York, New Haven & Hartford collateral notes, and $10,000,000 Harlem River & Port Chester 5 per cent notes. Thus, as *The Wall Street Journal* points out, $3,000,000 of the maturing notes will be paid for out of current funds, and this is the first reduction in the New Haven floating debt since 1911. The new notes are being offered to the public at 99¼ to yield 5¾ per cent.

Oakland, Antioch & Eastern.—Jesse W. Lilienthal, president of the United Railroads of San Francisco; H. A. Lardner, of the J. G. White Engineering Corporation; C. Osgood Hooker, F. H. Beaver and A. Haas have been elected directors, and Henry T. Scott, president of the Pacific States Telephone Company, and H. A. Mitchell have retired from the board.

Toledo, St. Louis & Western.—The protective committee for the preferred and common stock, J. S. Bache, chairman, announces that more than 70 per cent of the outstanding stock has been deposited with the committee and that the time for making deposits has been extended to May 1 and that after that time deposits will be received only on the payment of 50 cents a share.

Vandalia.—This company, operating 910 miles of line, inclusive of the line of the Terre Haute & Peoria which it leases, in the fiscal year ended December 31, 1914, had net income, after the payment of expenses, rentals, taxes and interest of $282,559 as against $369,259 in 1913. The increased net was primarily due to the business depression resulting in a decreased carriage of bituminous coal which normally constitutes over 50 per cent of the total freight tonnage.

The Vandalia is controlled by the Pennsylvania Company. It operates lines from Indianapolis, Ind., to East St. Louis, Ill.; from Rockville, Ind., to South Bend; from Logansport, Ind., to Butler; from Indianapolis to Vincennes,, giving it a total main line of 609 miles, and in addition it has branches aggregating 30 miles. The Terre Haute & Peoria operates lines from Farrington, Ind., to Decatur Junction and from Maroa, Ill., to Farmdale, a total of 145 miles. The Vandalia also operates 16 miles jointly with the Chicago & Eastern Illinois from Otter Creek Junction, Ind., to Rockville, and it has trackage rights, totaling 109 miles, over a number of roads which give it access to Terre Haute, Peoria and Toledo.

In 1914 the Vandalia earned freight revenue per mile of road of $8,093 and passenger train revenue per mile of road of $3,625, these being decreases respectively of $771 and $220. The ton mile rate in 1914 was 6.17 mills as against 6.59 mills in 1913, the total ton mileage carried being 1,193,096,783, an increase of 15,436,065 tons. The company estimates that the average cost per ton mile was 5.20 mills, a decrease of .23 mills and that the net revenue per ton per mile was 0.97 mills as against 1.16 mills in 1913. The average trainload of revenue freight in 1914 was 397 tons, and in 1913, 381 tons. The average passenger receipts per passenger mile in 1914 amounted to 2.137 cents, and in 1913 to 2.134 cents.

The Vandalia controls the Terre Haute & Peoria by lease and the figures given above include the combined operations of both companies. The Vandalia lost $271,150 by the operation of its leased line, an increase of $18,573 over 1913. The Vandalia has been paying 4 per cent dividends, but no dividend was declared in 1914. On December 31, 1914, there was cash on hand of $1,205,454 or $272,164 more than on December 31, 1913. The total current liabilities at the close of the year were $1,404,784.

Wabash.—George J. Gould, Edward T. Jeffery and Winslow S. Pierce, as directors of the Wabash, on October 15, 1913, are held liable by the appellate division of the Supreme Court of New York for $5,133,307, with interest, for illegal bond transactions which took place in 1906. Suit was brought by James Pollitz on behalf of himself and other stockholders.

Western Maryland.—An agreement has been reached between the Western Maryland and the Baltimore & Ohio by which the Western Maryland is to get trackage rights to a connection with a line which it proposes to build from a point in Somerset county to a point in Westmoreland, which line taps properties of the Consolidation Coal Company. The Consolidation Coal Company is understood to be controlled by John D. Rockefeller, who also controls the Western Maryland.